* Reg. U. S. Pat. Office ARCHITECTVRE *
Published by Charles Scribner's Sons
THE PROFESSIONAL ARCHITECTVRAL MONTHLY
VOL. LII SEPTEMBER, 1925 NO. 3

The Effect of Gravity on Building Construction

By H. Vandervoort Walsh
Professor of Construction, School of Architecture, Columbia University

Article I

HOW IT HAS INFLUENCED OUR IDEAS OF ARCHITECTURAL DESIGN

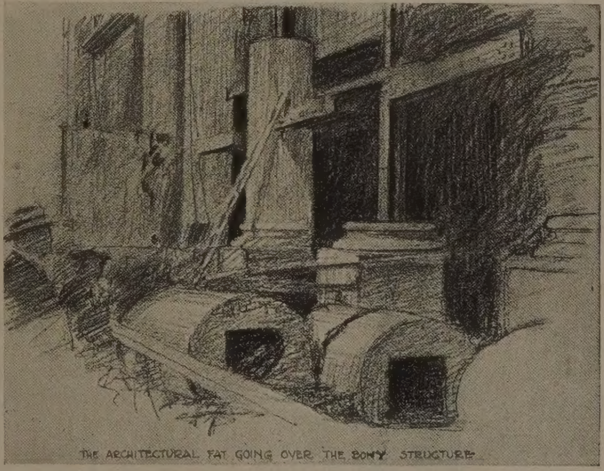
THERE is a simple story in the "Dialogues of Saint Gregory the Great" that illustrates how little the mediæval architects and masons knew of the action on a building of the force we call gravity. About the year 530 A. D., when Monte Casino was being erected, the masons found that a certain stone had taken on great weight and would not be lifted from the ground. News of it was reported to Saint Benedict, who explained that it was the devil holding on to it. He accordingly prayed that the stone might be released from the devil's grip, and it came to pass that it was, for he himself was able to lift it and set it in place.

In this day and generation there are architectural designers who, although they are not quite so ignorant of the mechanics of construction as our ancestors, are, nevertheless, uninterested to learn about it, and boast of having passed through some course on the subject in college and afterward having promptly forgotten the matter. Such mysteries they leave to the engineer.

This attitude of mind is but another indication of that weakness of intellect which characterizes most of us to-day, including architects. We glibly talk of the scientific mind that has made our age different from those of the past, and yet most of us go on thinking in the same dreamlike manner, accepting ideas as true simply because they are hoary with age. Especially in our architectural schools do we emphasize the acceptance of an idea because it is old and has passed safely through the criticism of many generations. Nearly 90 per cent of our educational methods in architecture are based upon the assumption that because an idea is old it must be good. Students are taught to accept the suggestions of their critics of design without too many questions, because these critics are older. They are not supposed to do much arguing about them, since, they are told, taste and things of art are not to be reasoned about, but are matters of feeling. In their history courses they study the old masterpieces of architecture as models to copy from. They learn that the Greek temple is one of the greatest examples of architecture and are encouraged to copy its details in creating new buildings. Indeed, we could enumerate one thing after another to show that the architect's training emphasizes the notion that an idea must be good if it is old and has tradition in back of it.

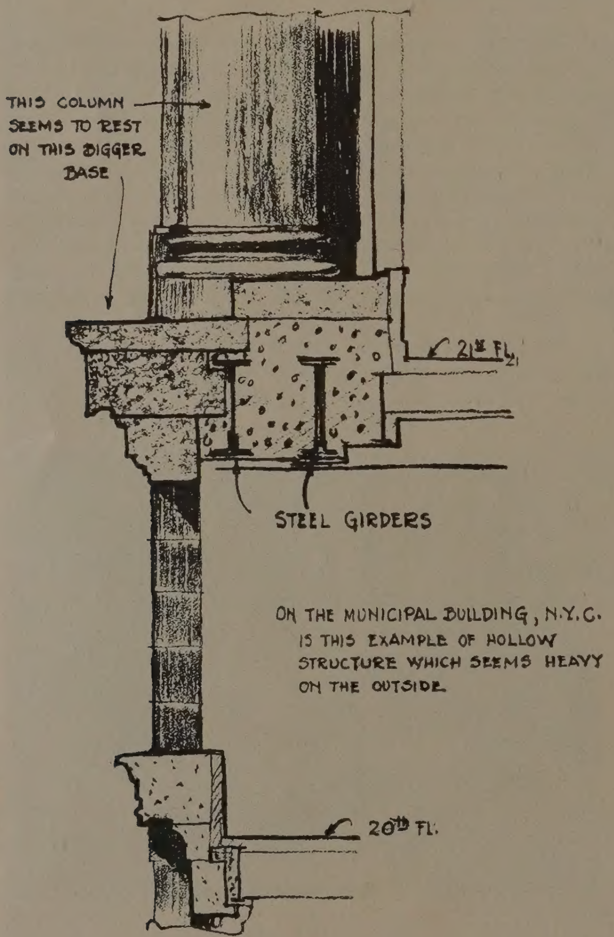
American architects as a class believe that architecture is like a language, and that the words are already established in the traditional styles developed by our ancestors. It has been said that whenever a good and original design is conceived, it is because the architect cribbed his ideas from a book or similar source not previously used by other architects. We are constantly warned that all conscious attempts at originality have failed, and that originality consists in using traditional forms in a suitable way to fit our new plans. Many believe that this conservative spirit has made our architecture advance beyond any other contemporary art.

But it must be noted that in this architects are, after all, thinking about the same way as others to-day. Most people are conservatives. The radical is the exception. The majority accept ideas because they are old. Few question the established order of things.


THE ARCHITECTURAL FAT GOING OVER THE BONY STRUCTURE

And yet a strange thing has happened in architecture. We have learned to build in a very different way than our ancestors. This new method of construction is the result of the investigations carried on by a few independent thinkers. The steel frame, reinforced concrete, the truss, Portland cement, the Guastavino dome, and other features of modern construction are absolutely new and are the children of knowledge developed by a few individuals who refused to accept ideas simply because they were old. Instead of blaming the action of gravity on the devil, they began to investigate it, trying this and that combination, and they found that it worked according to certain principles. Our ancestors never asked what was going on within the various structural members of a building. They never even conceived of the idea of forces working within a building.

It is ridiculous to picture the mediæval builder as a great engineer, understanding the action and counteraction of forces within the vaults and buttresses which he built. He did nothing of the kind. His knowledge of the mechanics of a building were not in advance over those which any boy to-day would observe in playing with toy building-blocks. Indeed, they learned to construct very much the same as a boy learns how to build with these blocks. He sets them up, piling them in this or that shape. Perhaps it is a tower he wants. Higher and higher he piles the blocks until the tower trembles and topples as he places on it the last block. From this he learns how high a tower he can erect.


THIS COLUMN SEEMS TO REST ON THIS BIGGER BASE
21st FL.
STEEL GIRDERS
ON THE MUNICIPAL BUILDING, N.Y.C. IS THIS EXAMPLE OF HOLLOW STRUCTURE WHICH SEEMS HEAVY ON THE OUTSIDE.
20th FL.

With not much more science the builders and architects of antiquity constructed walls, columns, lintels, and vaults from the experience they had gained from previous attempts that had failed. If they tried anything new, it was experimental. Their testing laboratory was in the field. They were never sure that a new type of building would stand until it did actually do so. The unwritten histories of architecture and construction are the lost records of the churches, temples, domes, vaults, and towers that fell and which taught their builders great lessons in construction. Historians of architecture do not refer to these mistakes, except casually. The falling of the central towers of the cathedrals in the Middle Ages was not uncommon. We have evidence that some of the buttresses and arches which were erected in these buildings threatened to collapse. For example, the tower of Gloucester Cathedral began to push over its supporting walls and to save them, inclined buttresses were hastily erected inside and out and a bracing arch was thrown across the transept. A similar bracing of the structure is shown in Wells Cathedral. Buttresses and flying buttresses are, after all, only permanent methods of shoring up piers and walls which have begun to fall over.

When a building is constructed in this manner, the builder is sure to be a little fearful of the results. He is not quite certain whether the structure will stand after it is finished. Lest he make a mistake, he errs on the side of safety by using structural parts much larger than necessary. As a result, his buildings are massive and oversubstantial.

Indeed, one of the basic ideas that all designers in architecture insist upon as a principle of composition is inherited from this primitive fear that the building might not stand up. This principle of design is usually stated in the following manner: All buildings and all ornamental composition must seem to be stable. That is, the very obvious and simple mechanics that a boy with building-blocks would work out must not be visibly violated. From this such rules of design as these are evolved:

1. A building should have a visible base.
2. Walls should be made to appear thick in order to make the building look strong.
3. The corners of the building should be strengthened visibly with rustication, pilasters, or similar things.

These accepted rules of architectural composition are derived from primitive fears for the safety of the structure. The buildings erected by our ancestors naturally conformed to these rules because their knowledge of the mechanics of construction was derived from the most childish observations. Architects accept these principles of design to-day simply because they are old and have traditional examples to give them weight.

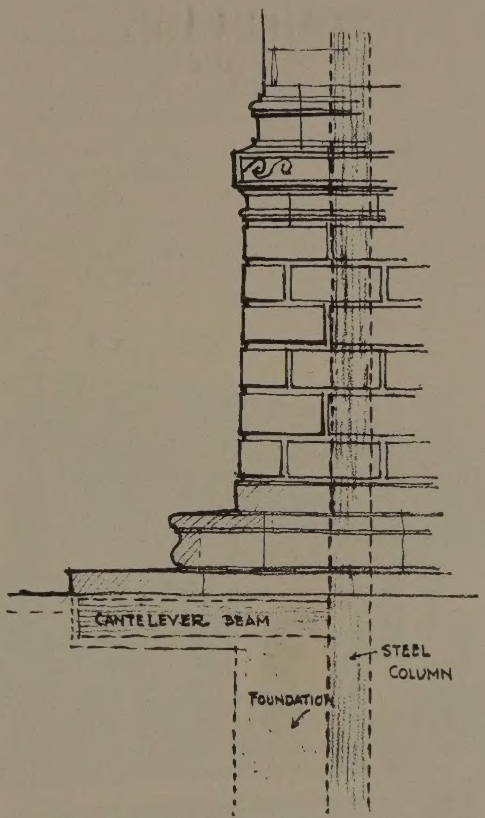
However, in modern times, a few have learned much deeper things about construction than our ancestors knew. But our architectural designers continue to follow the old rules of composition which were derived from primitive fears of our forefathers, and, accordingly, do some very illogical things.

For example, designers feel, because of these traditional notions of construction, that every building should have a visible base, like a masonry platform, upon which the building seems to rest. In order to do this, we go to such extremes as in the St. Louis Library to stick out, from the foundation walls of the building, steel beams to support the sham base of the building. We also design the walls of our monumental buildings to look very thick, although they are hollow when actually built. This is for the purpose of giving an impression of stability, for our ancestors had to build thick walls, and our ideas of strength are derived from their monuments. For years architects have been disturbed by the unstable appearance of tall office-buildings, resting on plate-glass windows. Is this not a curious state of things, to be annoyed at the apparent unstability of a building that is very stable? How can a thing be stable and not seem to be?

Thus we are faced with a very unreasonable condition of affairs in modern architecture. We spend millions of dollars to make our buildings look buildable according to the old notions of what was buildable and stable. Our designers are thinking in terms of childish and primitive mechanics, but our buildings are constructed according to newer and sounder ideas. Does it not seem reasonable to say that modern designers ought to bring their ideas of construction up to date? We need designers who will think independently and not merely accept ideas because they are old. They should know some of the things the engineer knows, only in a different way. They should have a developed sense or feeling of the action and reaction, bending and shearing of forces within a structure, so that their designs will reflect the newer knowledge of the mechanics of construction, and their sense of proportion and stability be developed beyond the primitive ideas of the architects of antiquity.

At present the training in the schools of architecture that the young man gets in applied mechanics and structural engineering is so divorced from his work in design that he looks upon these subjects as barriers in the way of his degree. They do not seem, in any way, to apply to the real problem of the architect, namely, creative designing. He is told by older architects that problems of structural engineering are turned over to an engineer to-day, and that the architectural designer never has any need of this knowledge. Accordingly these studies do not make the impression upon the student of architecture which they should. They are forgotten, as a closed and distasteful book.

It is not right that such a point of view should exist, and we are going to attempt in this series of articles to show how valuable to a designer can be the knowledge of the action of forces in a building. We will try to present the matter in such a way that it will give him a key by which he can develop his sense of construction, not as our ancestors knew it, but as we know it to-day.



HOW THE AESTHETIC BASE OF THE PUBLIC LIBRARY OF ST. LOUIS IS SUPPORTED

Good Workmanship Essential to Good Stucco

THE selection of a stucco contractor who knows his business and can show that he has done good work is the most important factor in securing good stucco construction, the Bureau of Standards of the Department of Commerce finds. At least, in the present state of the art more depends upon capable workmanship than upon many of the details of the specifications. The successful stucco specialist may be expected to know the requirements of the specifications, and will also have acquired a knowledge of the application of the material which can be learned only by experience. The plasterer trained for interior work does not have this necessary knowledge and experience, the bureau believes, and the saving in cost by hiring an inexperienced man will be made at the expense of appearance and durability of the job.

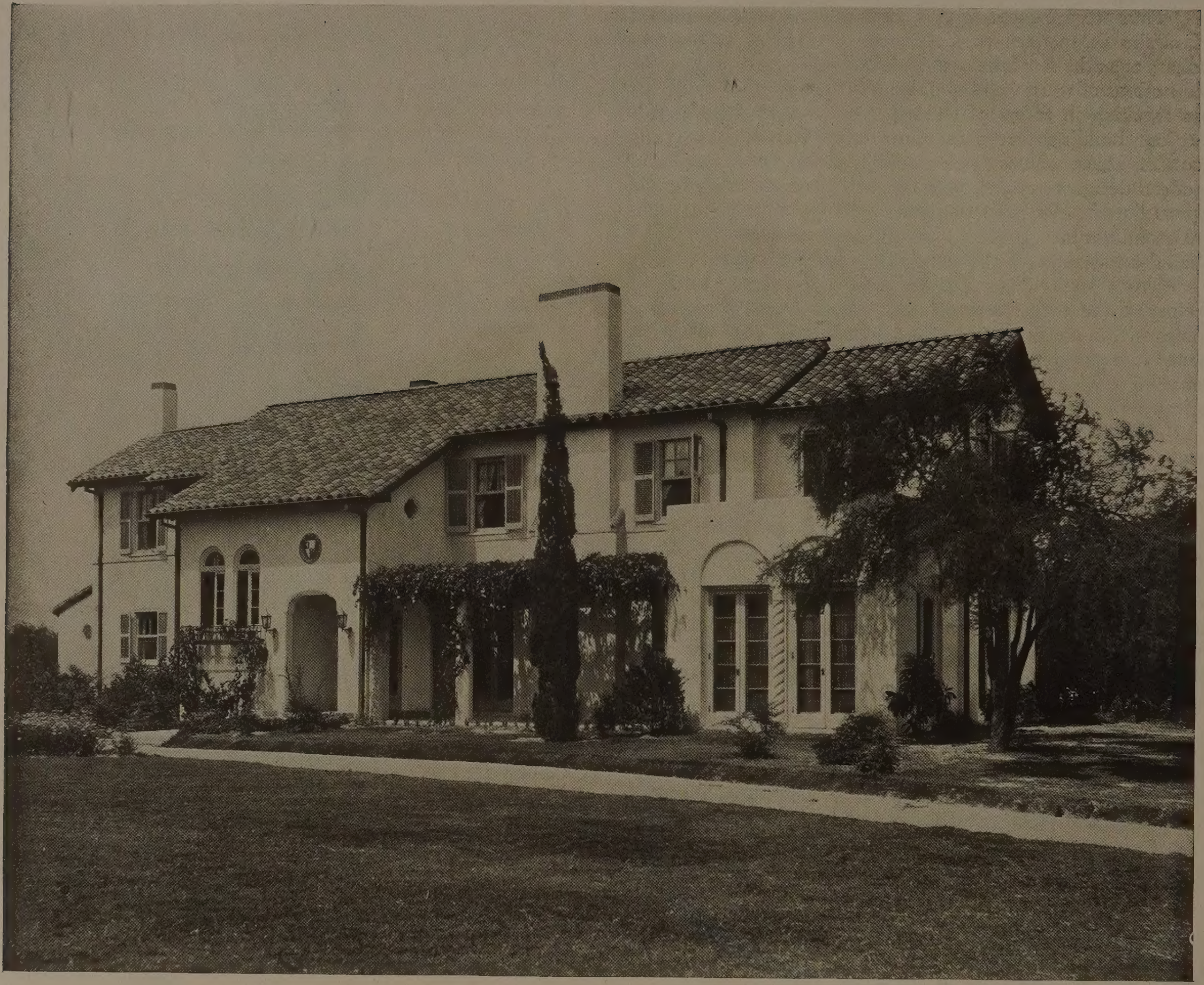
Tests on stucco construction have been in progress at the bureau since 1911. Panels of stucco made in accordance with different specifications have been constructed and exposed to the weather for a number of years. Some of these panels were of back-plastered construction; some were made with wooden sheathing. Paper-backed construction, plasterboard, and other types were also tested. Still others were applied to walls of masonry.

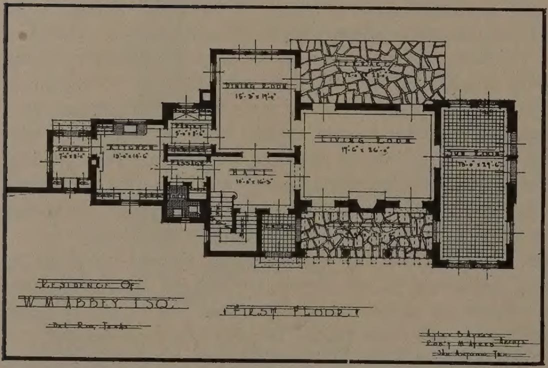
Measurements of the shrinkage of stuccos were also made by means of a special comparator. It was shown that this shrinkage may be controlled, to a large extent, by regulation of the amount of water used. The general rule is that the material should stiffen from removal of water before chemical set occurs, and the ability to recognize this condition is considered a necessary part of the plasterer's practical knowledge of his craft.

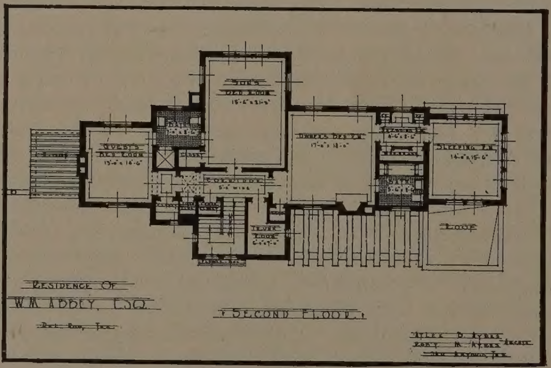
Masonry walls were found to make the best bases for stucco, and on them the finest stucco textures can safely be used. Fine textures are not recommended for use on frame construction, as they show cracks which are not visible in coarser textures. Where stucco is used on wooden frame the frame should be well braced, and the use of metal or wire fabric or metal lath for reinforcement is recommended. The tests showed that better results were obtained by omitting the sheathing, using special insulation and bracing where required. If sheathing is used it is thought horizontal sheathing would be preferable to the diagonal sheathing which was used in most of the sheathed test panels.

Special attention, the bureau says, should be given to the tying or lacing of the fabric or lath so that the joints do not constitute a line of weakness in the reinforcement.

Lean mixtures were found to give the best results. A mixture of one part cement, one-fifth part of hydrated lime, and three parts building sand is the richest recommended. Good design is considered essential and involves adequate flashing and overhead protection, and the restriction of stucco construction to vertical surfaces or to those which will drain quickly.







RESIDENCE, W. M. ABBEY, DEL RIO, TEXAS.

Atlee B. Ayres, Robert M. Ayres, Architects.

American Church-Building

By *Arthur Foster*

WHILE it is true that ecclesiastical art has hardly kept pace with the strides made by commercial and domestic architecture, it hardly deserves the quite general adverse criticism which it receives, for it has so wonderfully advanced during the last thirty years that to-day we have, especially in our smaller churches, examples of good architecture, at least equal to anything that has been done in Europe during the same period.

Before that time church-building in America was practically only of two kinds. First, and most generally, designs were put forward of buildings which were intended to meet modern requirements: these, naturally enough, ignored precedent, and with some notable exceptions were not successes; indeed, in some cases have come to be regarded as monstrosities. Secondly, especially in larger work, adaptations of existing European work more or less meritorious were attempted, and on the whole were perhaps as good as anything contemporaneous along the same lines that was done in other countries. Many of the quasi-Romanesque and Gothic churches which were put up from thirty to fifty years ago reflect great credit on their designers, and are to-day worthy of study, despite the wholesale condemnation heaped upon them by some of the present generation of architects, who, one is tempted to say, show no evidence of ability to equal, much less to surpass, them.

Just about thirty years ago church architecture received a tremendous impetus; English Gothic came to be regarded as the logical style for the churches of this country, and the leading exponent of this theory, a most voluminous writer on the subject, clearly stated that any style other than the chosen—not only of country, but of period—was taboo. This view of the matter came to be generally accepted by people of taste, and the building committees of non-Catholic churches cheerfully abandoned the meeting-house type of their forefathers and encouraged designs based upon purely Catholic precedent. Little by little this most facile of all the styles has broken away from mere archæology and has developed proportions and features in designs that are no longer copies of ancient work, but yet breathe the true spirit of Gothic tradition. Our architects are becoming more eclectic, and as a result the beauties of this style are no longer confined to buildings of the traditional plan; and, since all the styles are transitions from the preceding ones, it would seem perfectly logical to combine their appropriate features in a design regardless of the particular period in which they were originally employed.

It is passing strange that the Catholic Church has held herself aloof from the Gothic revival. Despite the fact that the English churches which served as motifs during these years were all pre-Reformation work, and as such Catholic heritage and germane to Irish work of the same period, and hence apparently of strong appeal to this large following in the church, she nevertheless came to look upon clerestory plans, stone interiors, and open-timber roofs as being essentially Protestant, and as a consequence has not profited by the recent impulse toward mediæval architecture.

But there is no question that she has wonderfully improved the design of her buildings during the same period. Notable examples of Renaissance, Byzantine, and Mission churches abound. The Romanesque style has been revived; even Colonial architecture has been pressed into her service, and some attempt has been made, though with no marked success, to disregard precedent altogether and to build in the Modern American style, though just what this may mean as applied to a Catholic church is hard to say.

This prejudice against Gothic is aimed only at what is felt to be certain of its salient characteristics. The long, narrow plan (aisle columns being especially taboo), with its comparatively high roof, and its intricate ornamentations, necessitating a great cost of construction, are among the chief objections raised to it.

But the Gothic style should not, in justice to the church's heritage, be lightly cast aside. It is at once peculiarly the child of the church and, as such, the style of all lands, and it has shown its adaptability to climatic conditions in the great cathedrals of all the countries of Europe. One has but to compare the works of northern and southern Italy, England, France, Germany, and Spain to see how this style can express the different civilizations in which it has been used, and, being the natural expression of universal religious sentiment, it will be found to be equally adaptable to American civilization in the twentieth century. It is based upon no hard and fast rules of proportion, its possibilities have by no means been exhausted, and it is capable of adaptation to modern methods of construction and utilitarian considerations to a degree which can perhaps hardly be claimed by the other great schools of architecture. Perhaps, as good an example as any of this particular quality is in the accepted design of what aspires to be the most beautiful skyscraper type of office building in the world. Then, too, stone is by no means the arbitrary material in which it must be constructed, for with the wide range of brick now available, this, and even conceivably terra-cotta, may enter largely into the design of our future church buildings, affording scope for color effects not always possible with stone. The little brick churches of northern Italy have furnished motifs for some of our best work and illustrate at once the adaptability of this material and the feasibility of designing in the Gothic style independently of what has come to be looked upon as its traditional plan, *i. e.*, the long, narrow, clerestory building with lofty roof.

In considering the future of church-building we are, of course, dealing with the subject only as a place of worship and ignoring the various activities that have come to be housed in the same group, sometimes, indeed, rivalling in importance the church proper. Such adjuncts with their broken plans and varying heights lend themselves most happily to Gothic treatment.

The "long-drawn aisles and fretted vaults," so characteristic of the great churches of Christendom, must, alas! perforce be sacrificed to modern requirements. These, in our more important towns, are generally for as large a building as possible with a seating capacity of say one thousand, all of which must be in sight of the altar and as near to it as possible, so that a plan approximating to the Greek cross would appear to be the logical one. The Byzantine style at once suggests itself as the suitable design for such a plan, though it is common to both the Renaissance and

Romanesque schools, as well as to the Mission style, which was apparently founded upon them, and hence there is no reason why it should not be designed to embody consistently many Gothic features, as the Mission style especially offers many possibilities of combination with them. The Pacific slope furnishes us with many examples of what may be accomplished along these lines, the Spanish rendering of this style entering most happily into such compositions. Indeed, when we consider that Mission is the one type of architecture indigenous to the soil, we may at least surmise that it will yet become the long-waited-for American ecclesiastical style.

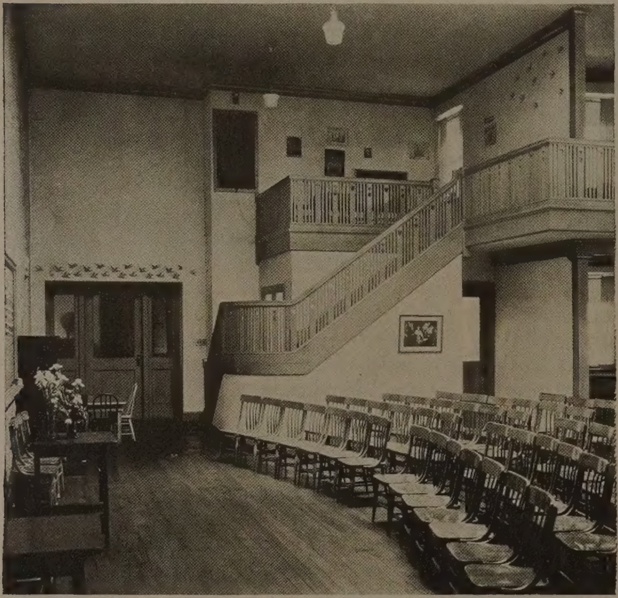
The design under consideration would, of course, gain enormously if columns were introduced outside the seating areas, though by throwing arches across the transepts and arcading the side walls, the converging-line effect can at least be suggested and further enhanced by as long and narrow a sanctuary as the points of sight will allow. The length of the building could be consistently increased by putting the organ and choir loft over the narthex, and the ceiling treatment made to emphasize the long and narrow proportions so potent in ecclesiastical work; the whole forming a composition to which Gothic treatment would lend itself admirably.

While no large church has yet been attempted along these lines, there are a number of smaller ones by some of our leading architects in which Gothic features, such as arches, traceries, and moldings, are used in buildings whose masses are suggestive of Romanesque planning. Buildings of the period in which this style merged into Gothic could be studied as motifs, and in cases where the plan more nearly suggests Mission feeling, Gothic as it was elaborated in Spain and southern Italy would seem to be the most logical form to use.

But Gothic, in some form or other, appears to the average layman a sine qua non of the church.

A Church Building Planned to Meet Present-Day Needs

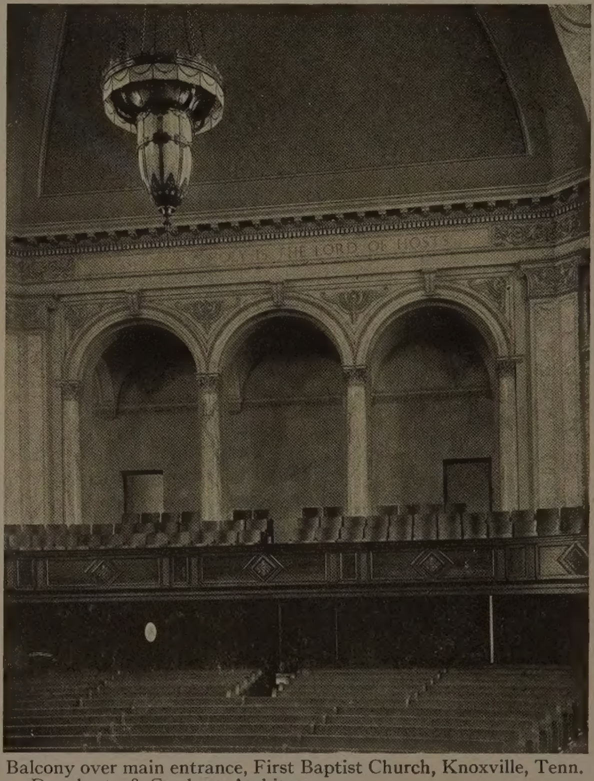
IDEALS of church life and service are most surely reflected in the buildings which the churches erect for their housing. Modern church designs thus set forth modern conceptions of church functions. We offer in these pages a building design which illustrates and declares the varied ministries of the First Baptist Church, Knoxville, Tenn.



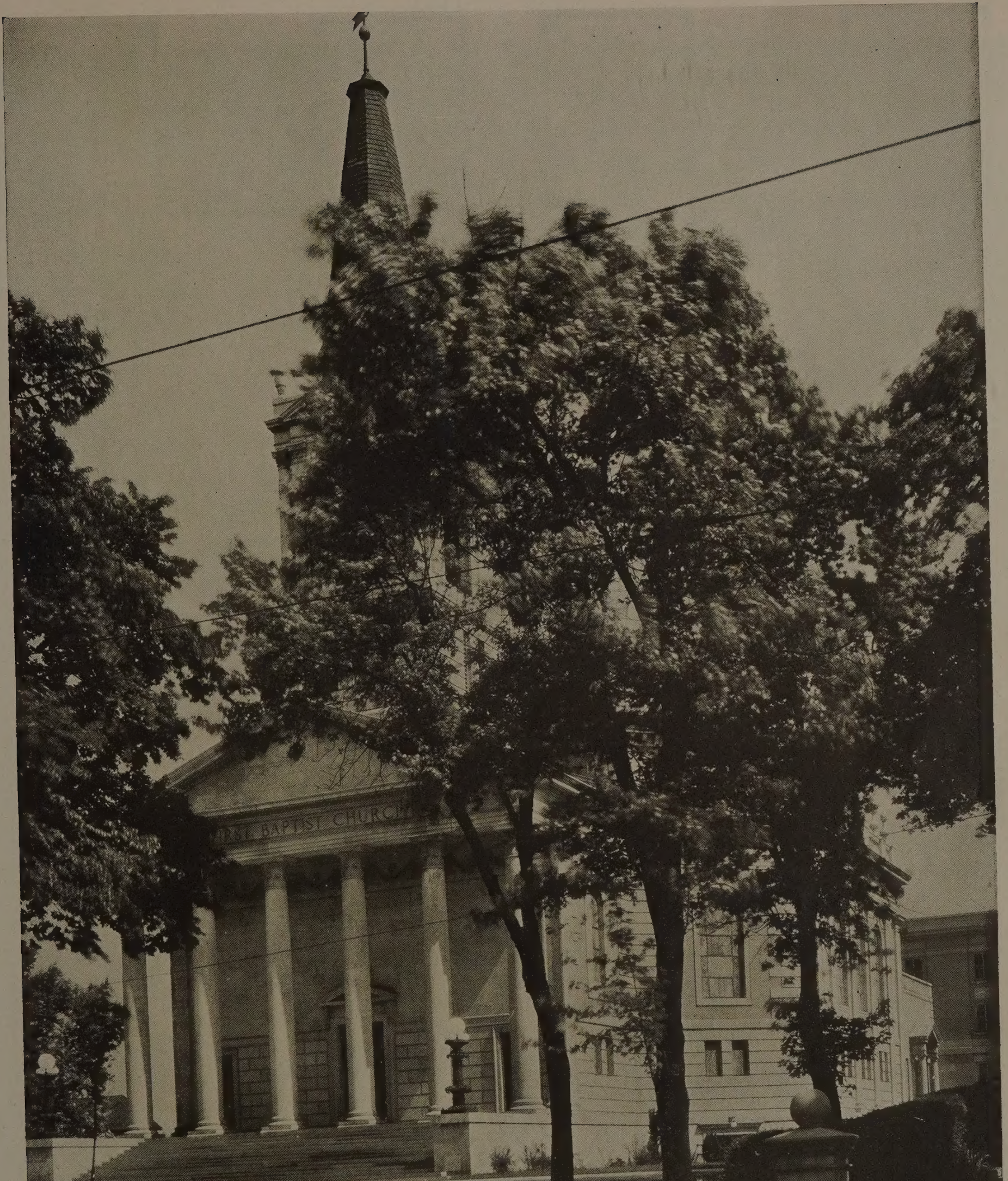
A classroom, Sunday-school, First Baptist Church, Knoxville, Tenn. Dougherty & Gardner, Architects.

Design Secured Through Competition.—The building committee, feeling its great responsibility and facing many difficulties, decided on a carefully regulated competition as the safest means of securing a suitable design and of selecting a capable architectural firm. Doctor Warren P. Laird was asked to conduct the competition. Doctor Laird visited Knoxville and made a careful study of the local situation, holding extended conferences with the committee. A complete schedule of provisions to be offered in the new building was wrought out; this schedule was carefully studied by the pastor and the local committee, attention being given even to the minutest details, until an acceptable programme was agreed upon.

Under the guidance of Doctor Laird, the committee selected five architectural firms to enter the competition. A jury of award, consisting of disinterested architects, acted as judges in the competition. This jury, together with the local committee, selected as the winning design the building presented in these pages, offered by Messrs. Dougherty & Gardner, Architects, Nashville, Tenn.

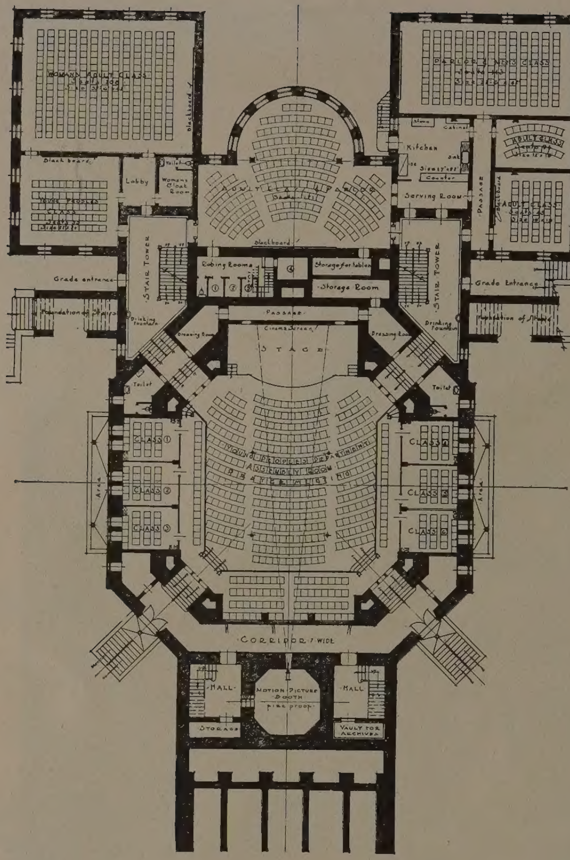


Balcony over main entrance, First Baptist Church, Knoxville, Tenn. Dougherty & Gardner, Architects.

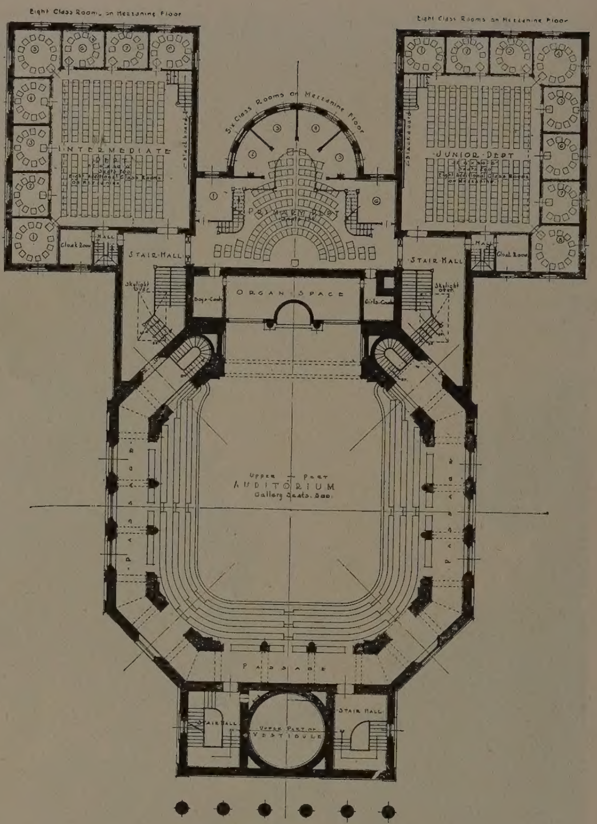


FIRST BAPTIST CHURCH, KNOXVILLE, TENN.

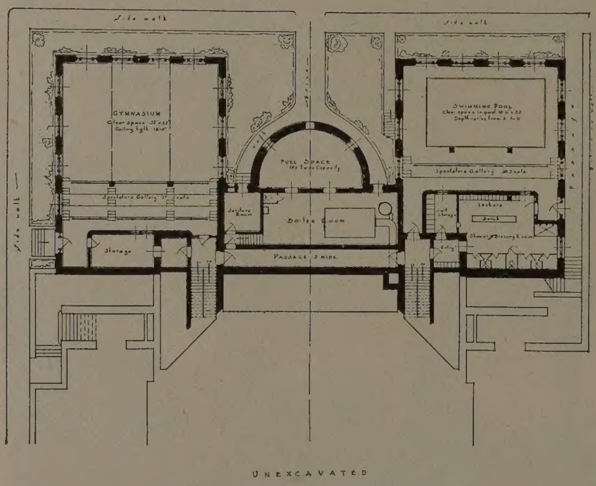
Dougherty & Gardner, Architects.



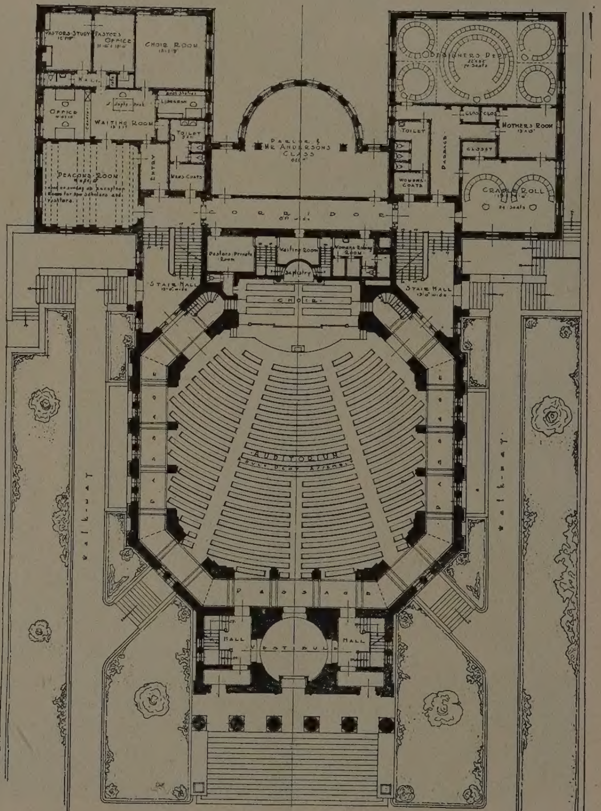
GROUND FLOOR PLAN



BALCONY FLOOR PLAN



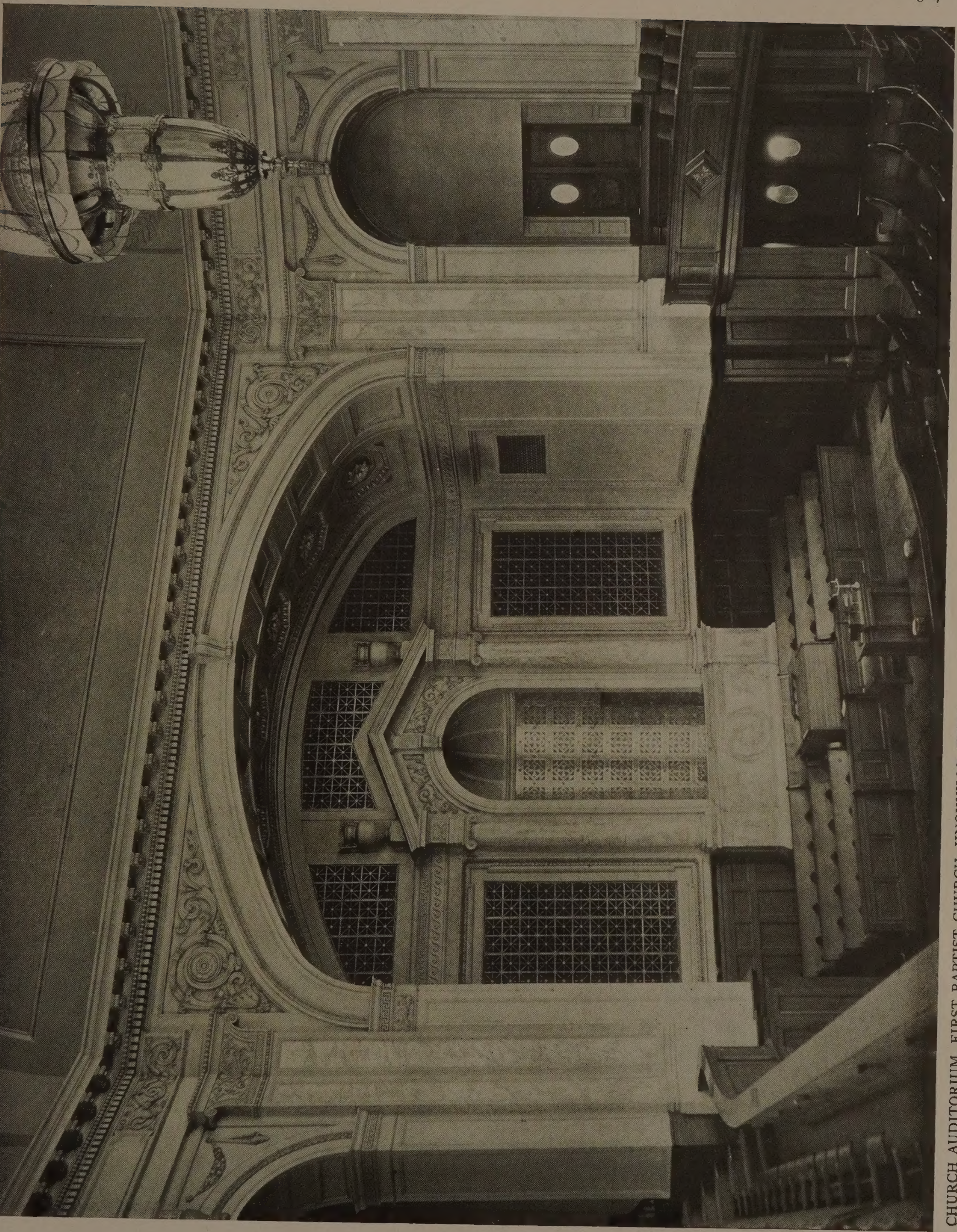
RECREATION (Basement) FLOOR PLAN



MAIN FLOOR PLAN

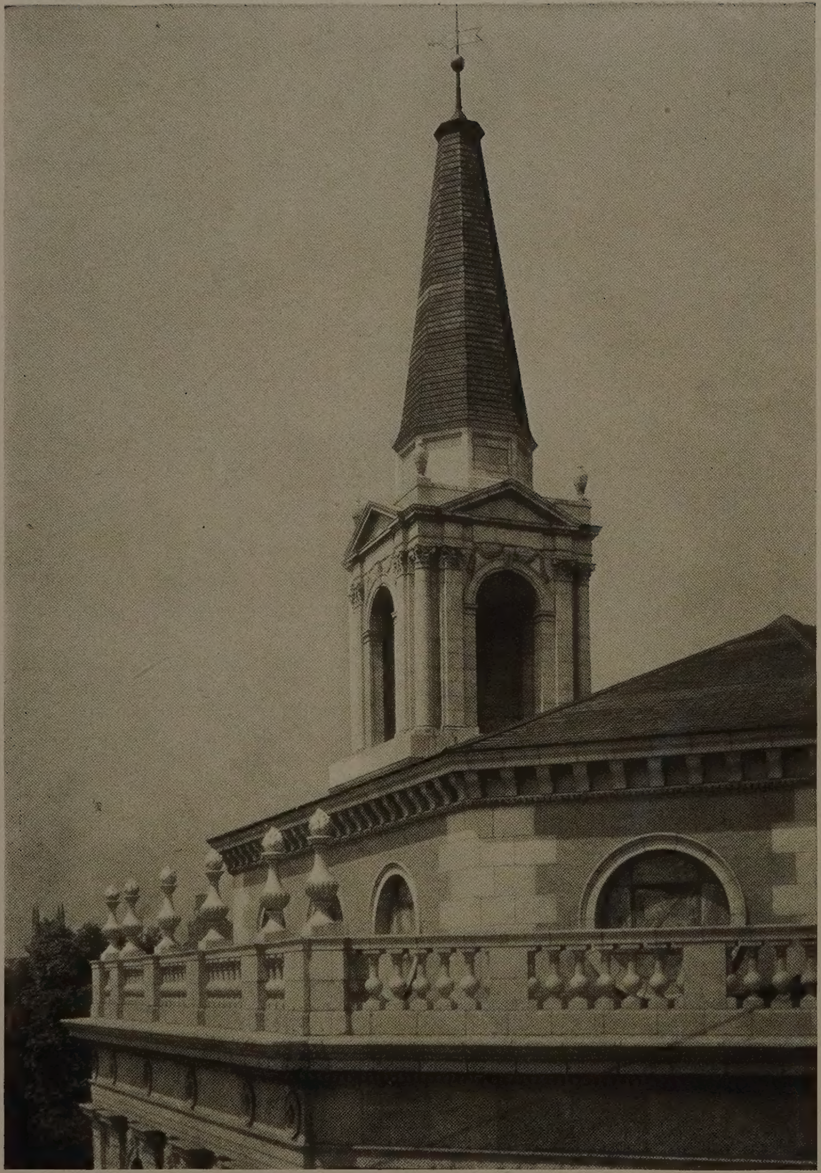
FIRST BAPTIST CHURCH, KNOXVILLE, TENN.

Dougherty & Gardner, Architects.

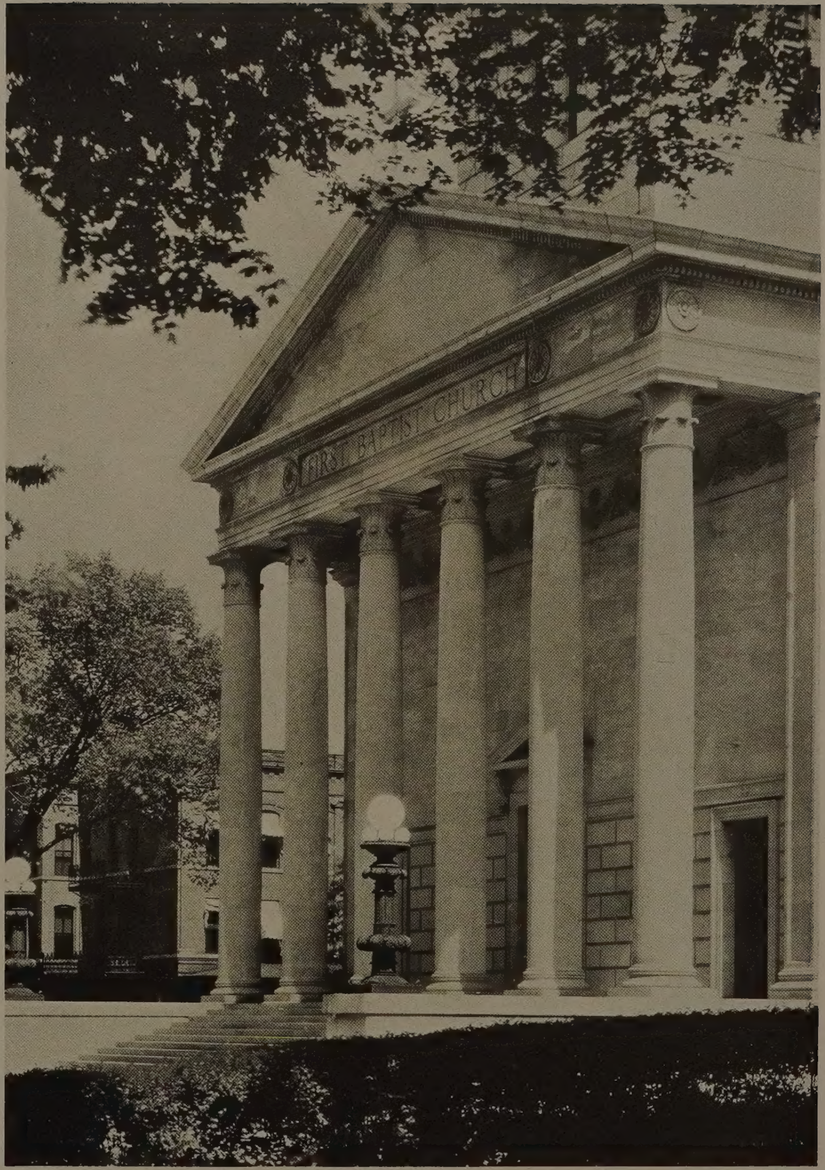


CHURCH AUDITORIUM, FIRST BAPTIST CHURCH, KNOXVILLE, TENN.

Dougherty & Gardner, Architects.



DETAIL OF DOME AND SPIRE.



PORTICO.

Dougherty & Gardner, Architects.

FIRST BAPTIST CHURCH, KNOXVILLE, TENN.

ARCHITECTVRE*
Published by Charles Scribner's Sons
THE PROFESSIONAL ARCHITECTVRAL MONTHLY
*Reg. U. S. Pat. Office

Editorial and Other Comment

Old-Fashioned Doctrine

ONCE upon a time we used to be told that a man was to be judged by deeds, not words; we were to be seen but not heard unless we really had something worth saying. But times have changed. This is the age of words, of publicity. The county weekly that thrives on the local items, "Sally Smith spent Tuesday in Danbury," "Deacon Johnson's new flivver has proved a bucker," etc., is rivalled by the big city papers, and personalities fill much space, even in organs devoted to such purely utilitarian matters as trade. You have to look mighty sharp for the man or woman who is hiding any wee bit of light under a bushel. There are rushlight flashes, lightning-bug glimmers catching our merry eyes wherever we go. Day and night on every highway little lanterns are telling us that their owners are on the way. Here and there we hear a voice crying in the wilderness and daring to show a decent and becoming respect for something not associated with flash-lights.

Sir Reginald Blomfield, one of England's greatest architects, a man of fine scholarship and broad sympathy with all the arts—our readers will remember his great "History of French Architecture from the Death of Mazarin to Death of Louis XV"—writing of Greek architecture says:

"A recent critic justified the antics of certain artists by the necessity they were under of advertising themselves. That, no doubt, is the readiest way to immediate success. But the question for the critic is, not the personal advancement of the artist, but the value of his work; and one would ask if any good work at any period in the history of art has been inspired by this ambition to shout louder than one's neighbors. Certainly the standpoint of the Greek was the exact opposite. He did not seek notoriety. He was happy with his inner vision of beauty, and intent only on its realization. He had not the smallest desire to shock or startle any one. There are occasions when shock tactics are necessary, but they are not necessary every day in the week, nor is it necessary to make a clean sweep of the past before one sets to work in one's own little corner of art."

He says a lot of other things we'd like to pass on: "The lesson of the Parthenon is the lesson of a steadfast vision of beauty, held high above individual effort and failure, realizing itself not in complex detail or calculated eccentricity, but in serene and exquisite simplicity of form. It teaches us that in the arts there are no short cuts, and that anarchy, the destruction of what has been won for us in the past, is not advance, but the straight road to the bottomless pit of barbarism."

"Capability Brown"

THE more closely one studies certain contemporary criticism of the arts, the more convinced one is that it is inspired by the dictum of the celebrated Capability Brown that knowledge hampers originality, says a noted English architect in an essay on "The Outlook of Architecture." The modern tendency to let the dead past bury the past has given us such things as Cubism, Gaugouin, Matisse, and others. Writing of a painting by Van Gogh, a critic remarks that "this rush chair becomes an object of profound significance, eloquent of the life of those who have used it, of the clumsy hands that have shaped it, and above all of its essential nature as a chair!"—Can you beat it? and this sort of stuff is taken seriously. Brown would deny us all reference to the good things that have made for better art; he would evolve an architecture from his inner consciousness, and the less he knows, the more he assumes the authority to dictate to those who have spent their lives in an honest but misguided effort to profit by the brains and experience of the past.

We have many Browns "in our midst," and if they shout loud enough they are heard by the man in the street, and for a little, brief time become prophets in the land.

Have You Something to Say?

ONE of the constant, unremitting, and insistent problems of an editor of a magazine like ARCHITECTURE is to persuade the other fellow to believe that he has something to say and knows how to say it. In the way of general and promiscuous writing the editor's task is usually much easier; he doesn't have to do any persuading. Every Tom, Dick, and Agnes knows he or she has something to say and can say it with words. Popular magazines are deluged with manuscripts of all kinds; everybody under the sun wants to say something. But architects are too busy or too modest to go rushing into print without persuasion, and apparently, as a class, like to mind their own business. We are fairly good persuaders, but we can't always get at or have the proper talk with the persuadee. We sometimes wonder why it is that some of our readers who suggest interesting articles don't sit down and beat out their thoughts on a responsive typewriter or dictate their "stuff" to the young lady secretary who would just love to write an article.

We have had a lot of good suggestions regarding ways of making ARCHITECTURE better; its pages are hospitably inclined toward your special experiences, and there are many of our readers who have things to say worth saying. Practical articles appeal to us, but when we say practical we don't always necessarily mean something about how to make bricks lay. As a matter of record, some of the best practical articles ever published have been some that were filled with facts plus a personal note—born of experience—on the right use of facts. It's the old human equation that touches up even the dullest job with a bit of inspiration.

We are always in a receptive mood toward contributions of a helpful and constructive character.

A Letter from the Past President of the Southern California Chapter of the Institute

To the Editor of "Architecture"

Dear Sir: In your June issue I noticed a number of articles on the subject of Allied Architects Association of Los Angeles, and as a past president of the Southern California Chapter of the American Institute of Architects, I would like to express a few of the many things I might say on this subject.

I am very sorry that your magazine as well as a number of other magazines publish all the advertising matter that the publicity department of this organization furnish you, particularly as you make no charge for same. I feel that it is time you stop publishing their trash, which is misleading the architectural profession of the United States, until you have made an investigation of the true facts of the situation.

If you listen to their stories, this organization has advanced architecture several generations ahead of its time, but, as a matter of fact, it has set the practice of architecture in southern California back farther in three years' time than it has advanced in any generation.

In this particular letter, above referred to, in the third paragraph, the author makes the statement that their work is limited to buildings of public character. They have failed to tell you that they run a common drafting-room, and that many of their members have done away with their architectural offices and have now become brokers, chasing the streets of our cities to get work at the best possible figures, and then dickering with this drafting-room as to the cost of turning out the plans and specifications. Some of the work done in this way is criminal. Several particular examples being buildings erected in Santa Barbara, where the recent earthquakes did so much damage. Had this work been in the hands of competent architects, several lives would have been saved. Another instance is a city school in the city of Los Angeles, where the drawings were made by this drafting-room, and the resulting errors have brought discredit on the architectural profession. Over twenty-five sheets of drawings were incorrect, and the bills of extras, presented by contractors, involved over $55,000 on work that cost but four times that much.

In this same paragraph is a statement that the membership comprises sixty-nine of the leading architects of southern California, and that brings up the question of what is "A Leading Architect." As a matter of fact, this organization is comprised of a group of men not more than five of whom have either experience or ability to handle large work, and the rest have been inveigled into the group with the vision of being a party in the constructing of our great public buildings.

In the fourth paragraph there is a statement that the members do not work for personal profit. This is an absolute falsehood, as the members are paid for their time spent, and the amount they receive is more than most of them receive in private practice; in addition to this, certain officers have received quite nice sums of money.

They state that they maintain a school of architecture for university students, where, as a matter of fact, their members are acting as instructors in the class of architecture at the local university.

They make the statement that they have, out of their funds, spent $45,000 for preparing a complete civic-centre plan for the city and county of Los Angeles, which, by the way, is a dream, and has never been accepted. I defy this organization to come out in the open and allow me to show them where this $45,000 came from, for this money was obtained by direct fraud, and the taxpayers of southern California are paying it.

This article mentions the commission of preparing plans for a $5,000,000 addition to the Los Angeles County Hospital, and they harp on how interesting it is to see the remarkable hearty co-operation on the part of the sixty-nine architects, etc. As a matter of fact it is a disgrace to the architectural profession to see the way that this job is being handled, with apparently no one in the whole organization with any experience or ability to build the building in a workmanlike manner, or in a reasonable length of time. I believe I am not far astray in saying that almost one year has been spent and only sketches made. I forgot to mention that the allies employ a paid politician, or, more properly, a "ward-heeler."

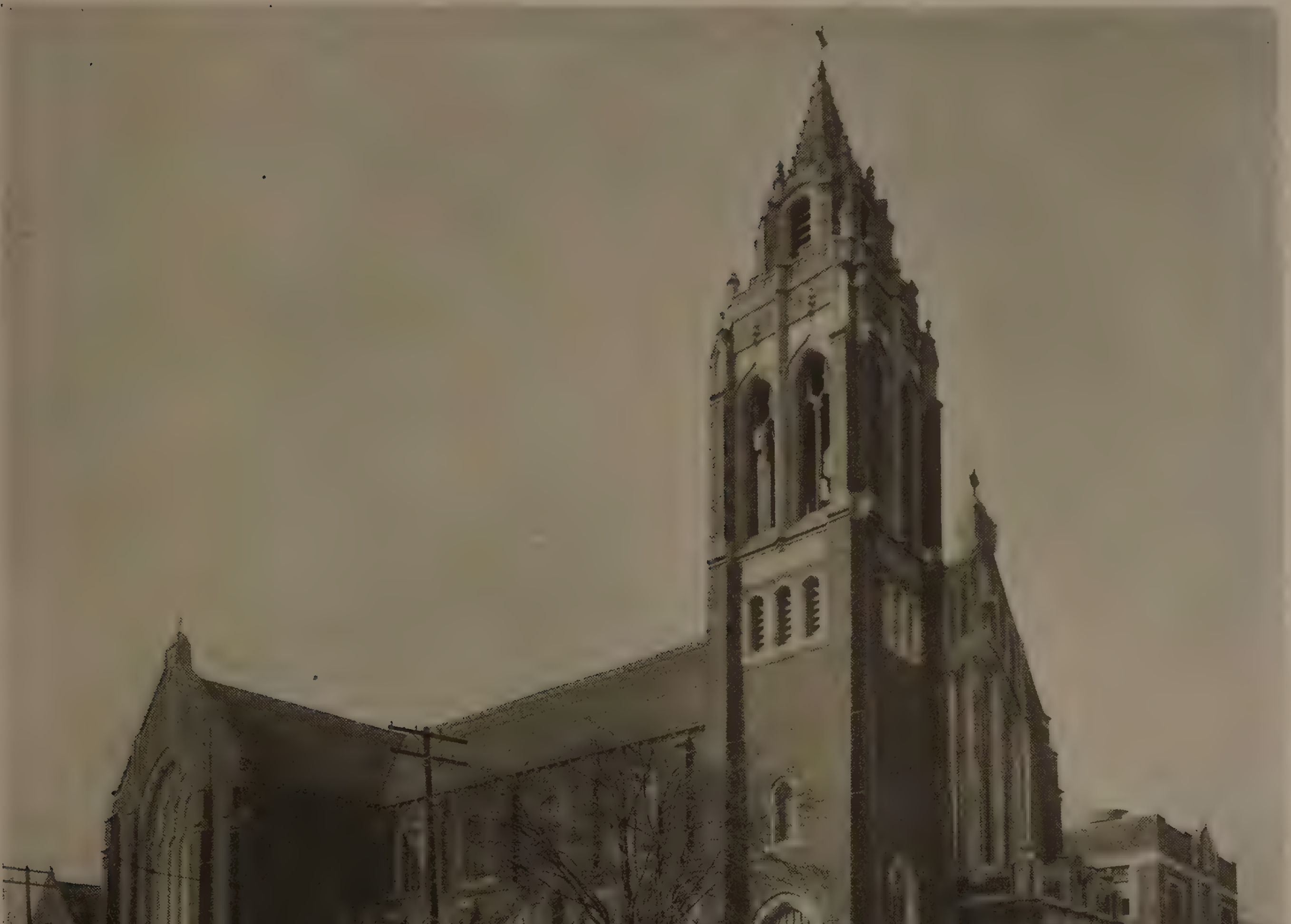
I should stop, but before doing so will tell the architectural profession that twenty-one months ago our local Chapter was astounded when the nominating committee entered the meeting-room on election night, with a list of nominees, including those of delegates and alternates, with every name on the list a member of this group. When my attention was called to the fact, I took the floor and asked them to be square. They had the house packed, and laughed at me. Again at last election they repeated the performance, and now hardly any one attends the meetings excepting this group of "leading architects," who have never been able to make a success in their own private practices, and who have resorted to this wild dream to get a chance to build a big building. To-day most of the Chapter meetings are held in the offices of their corporation.

Hoping that other chapters will beware of the propaganda of this institution, and trusting that we will soon have our chapter a meeting-place of men who place the interest of their profession above their own selfish interests, I am

Sincerely yours, Albert C. Martin,
Architect, Past President of the Southern California Chapter of the Institute.

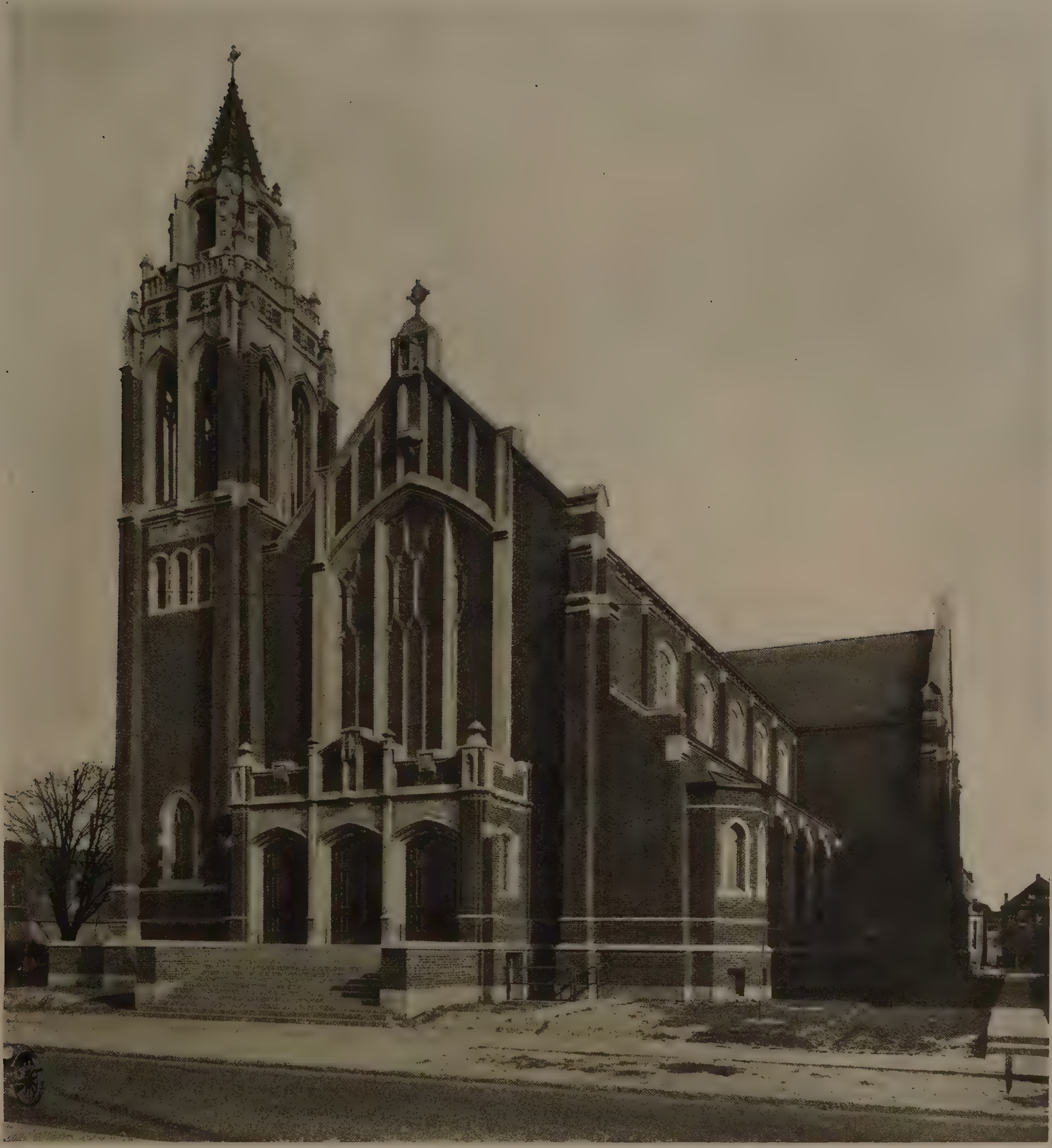
Exhibitions of the Philadelphia Chapter of the Institute

THREE exhibitions have been held or projected by either direct action of the Chapter or in connection with others. The Annual Exhibition in conjunction with the T Square Club was, of course, the most important of these. Held at the new Art Museum and in the corridors of City Hall, it has had probably the largest attendance of any exhibition we have ever held, and accordingly has gone far toward upbuilding the prestige of the profession. Six other Philadelphia organizations also collaborated in this. The exhibition the Chapter sent to New York during the Convention made an excellent showing, and was very favorably commented on by delegates from all over the country. Some of the Chapter exhibitors were asked as a result of this to send work to the exhibition held by the Cambridge School of Domestic Architecture and Landscape Architecture at Cambridge, Mass. As this letter is written another exhibition is in the making, a travelling exhibition of Philadelphia Chapter Work to go out this autumn under the auspices of the American Federation of Arts, the work to be selected and started off by our own Committee. All honor and appreciation to those self-sacrificing and hard-working members whose organization and execution of the nasty million and one grinding details of collecting, judging, and arranging makes these exhibitions a success, and by that a credit to all of us.

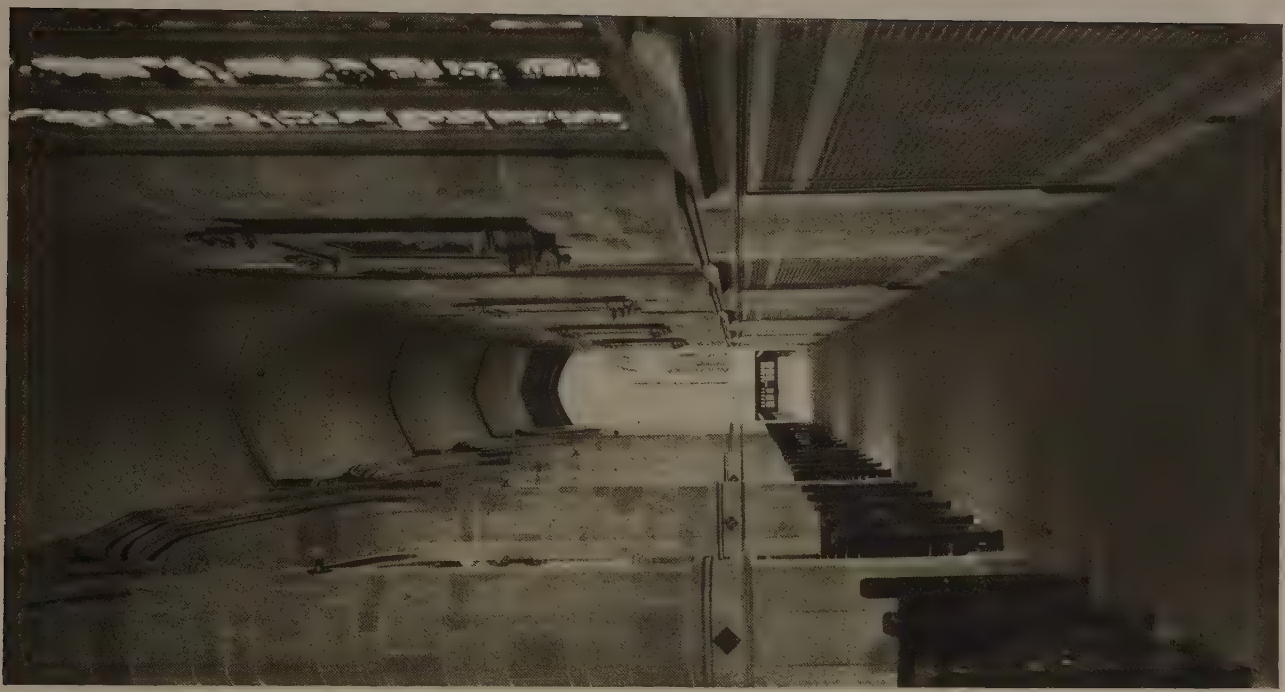


ST. AGNES'S CHURCH AND RECTORY, DETROIT, MICH.

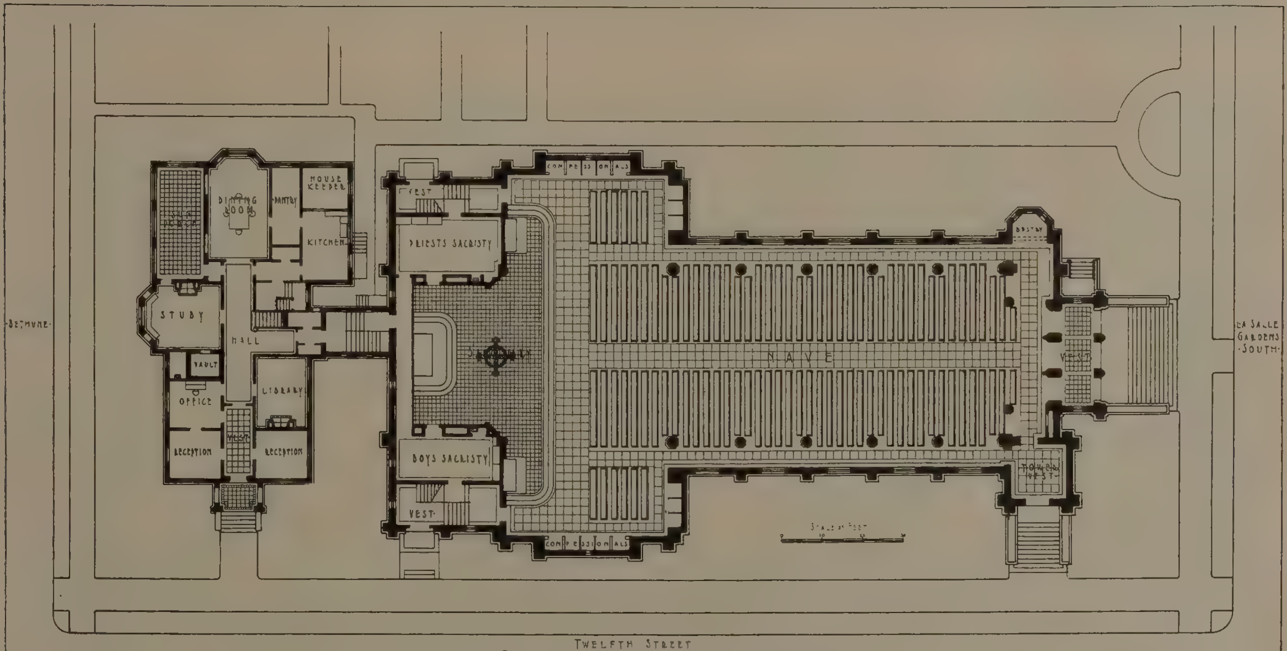
Van Leyen, Schilling & Keough, Architects.



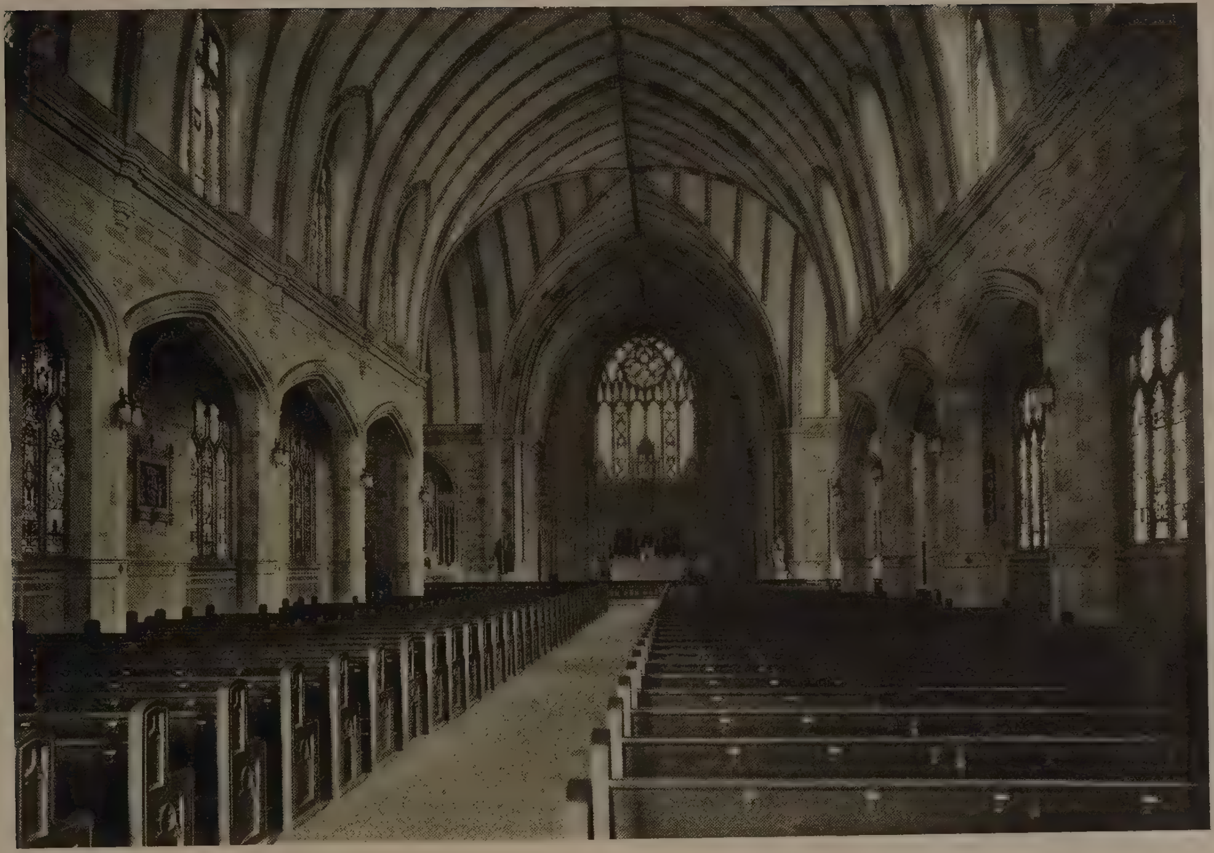
ST. AGNES'S CHURCH AND RECTORY, DETROIT, MICH. Van Leyen, Schilling & Keough, Architects.

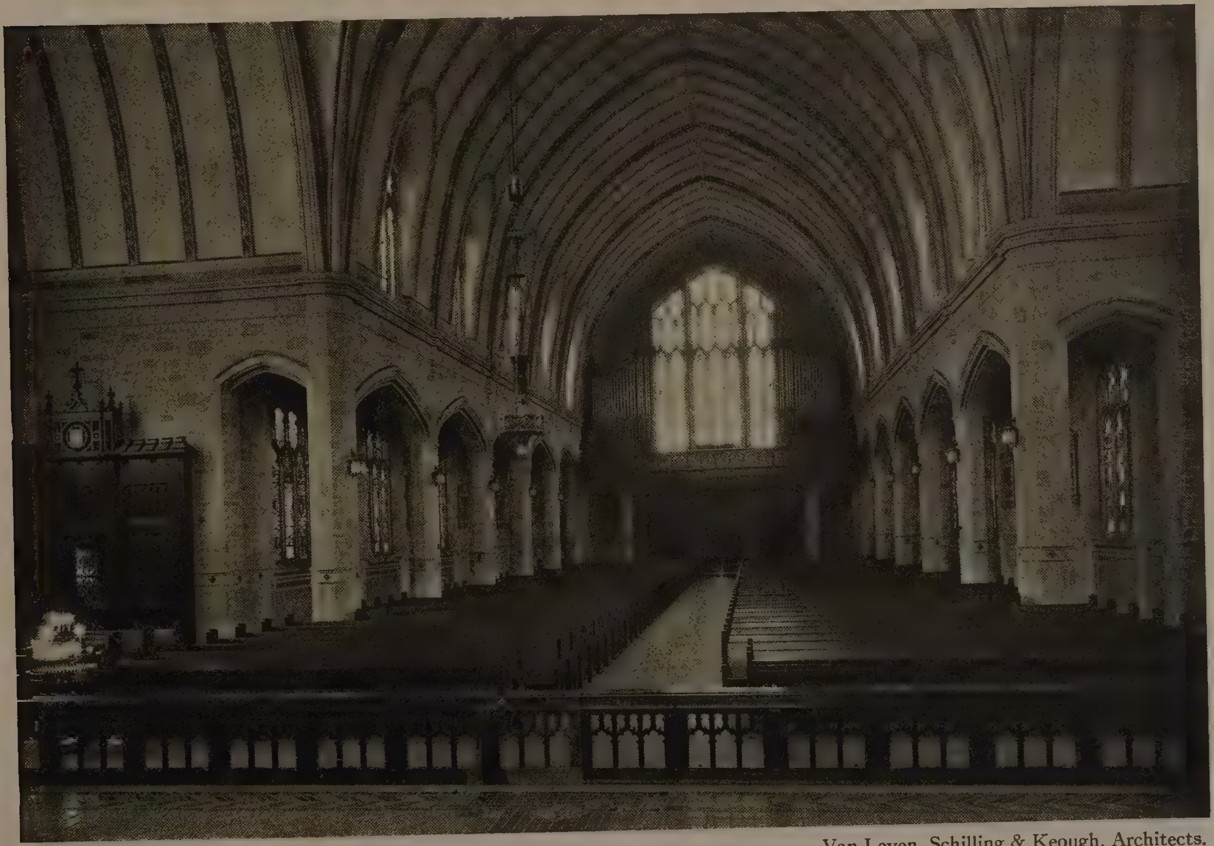


ASILE. Van Leyen, Schilling & Keough, Architects.



·St·Agnes Church & Rectory·
·Van Leyen·Schilling & Keough·
·Architects & Engineers·Detroit Mich·

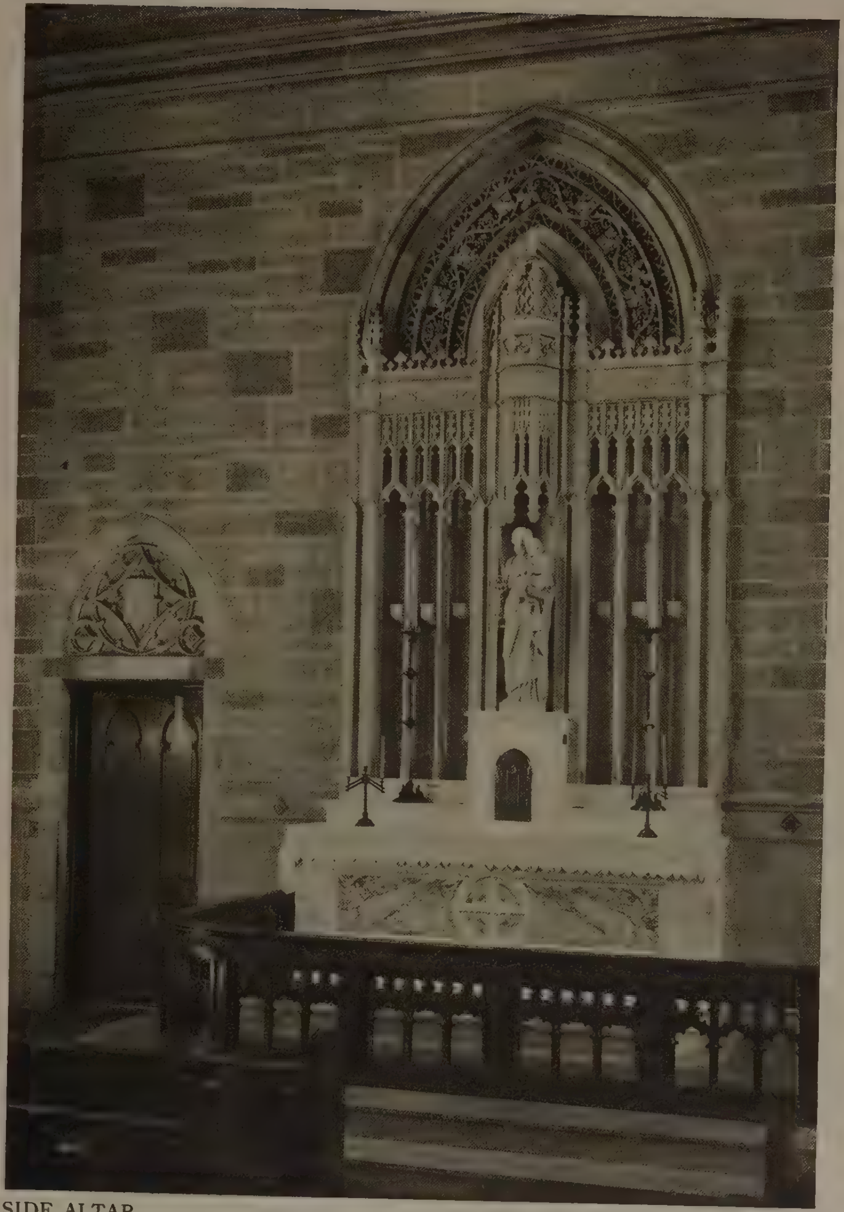




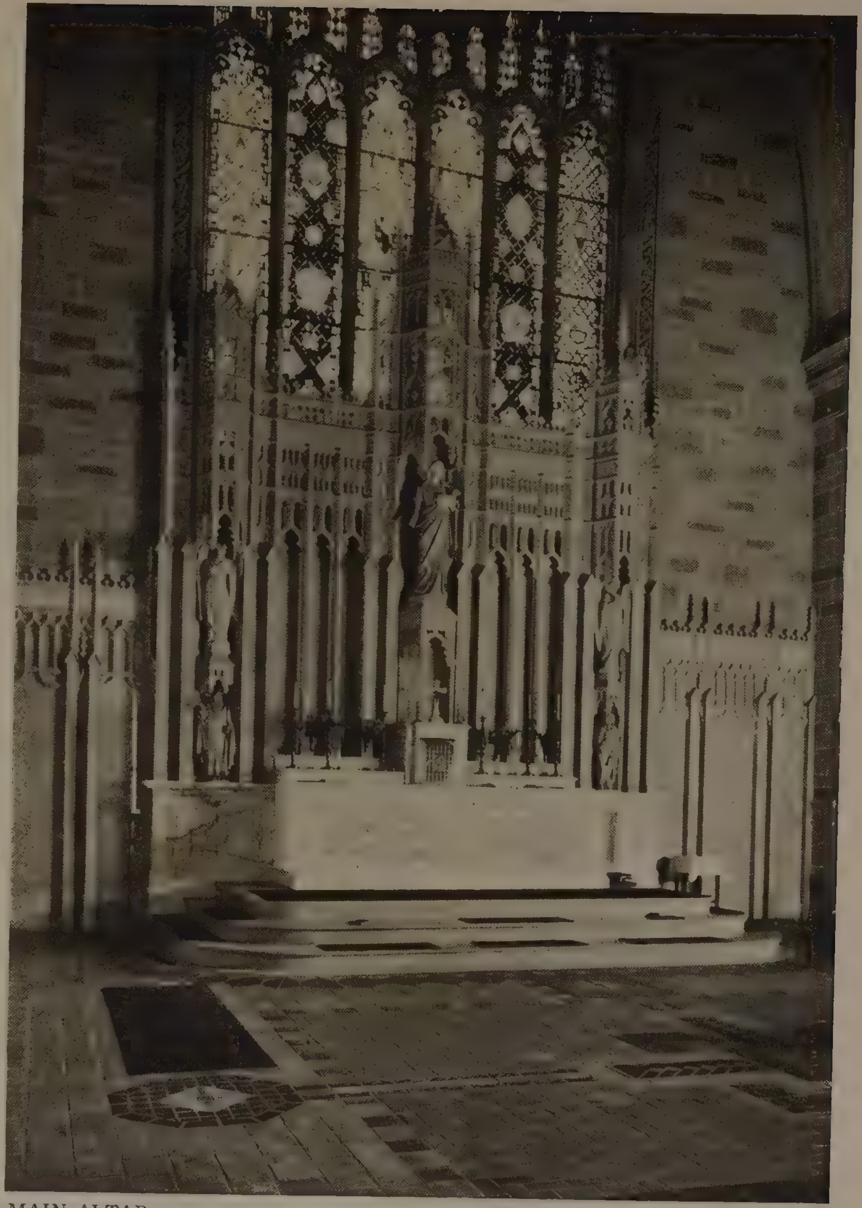
CHURCH AUDITORIUM.

Van Leyen, Schilling & Keough, Architects.

ST. AGNES'S CHURCH AND RECTORY, DETROIT, MICH.



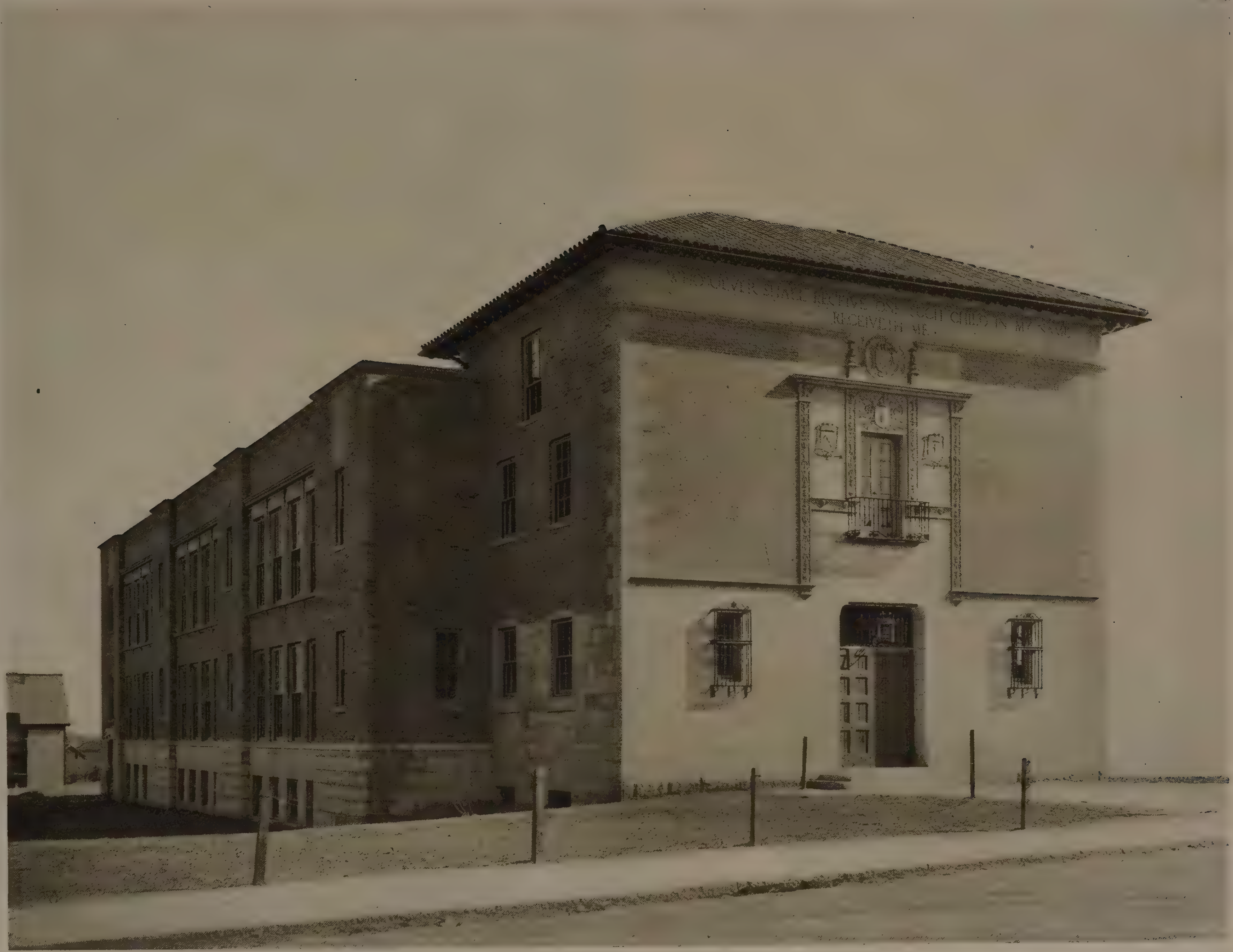
SIDE ALTAR.



MAIN ALTAR.

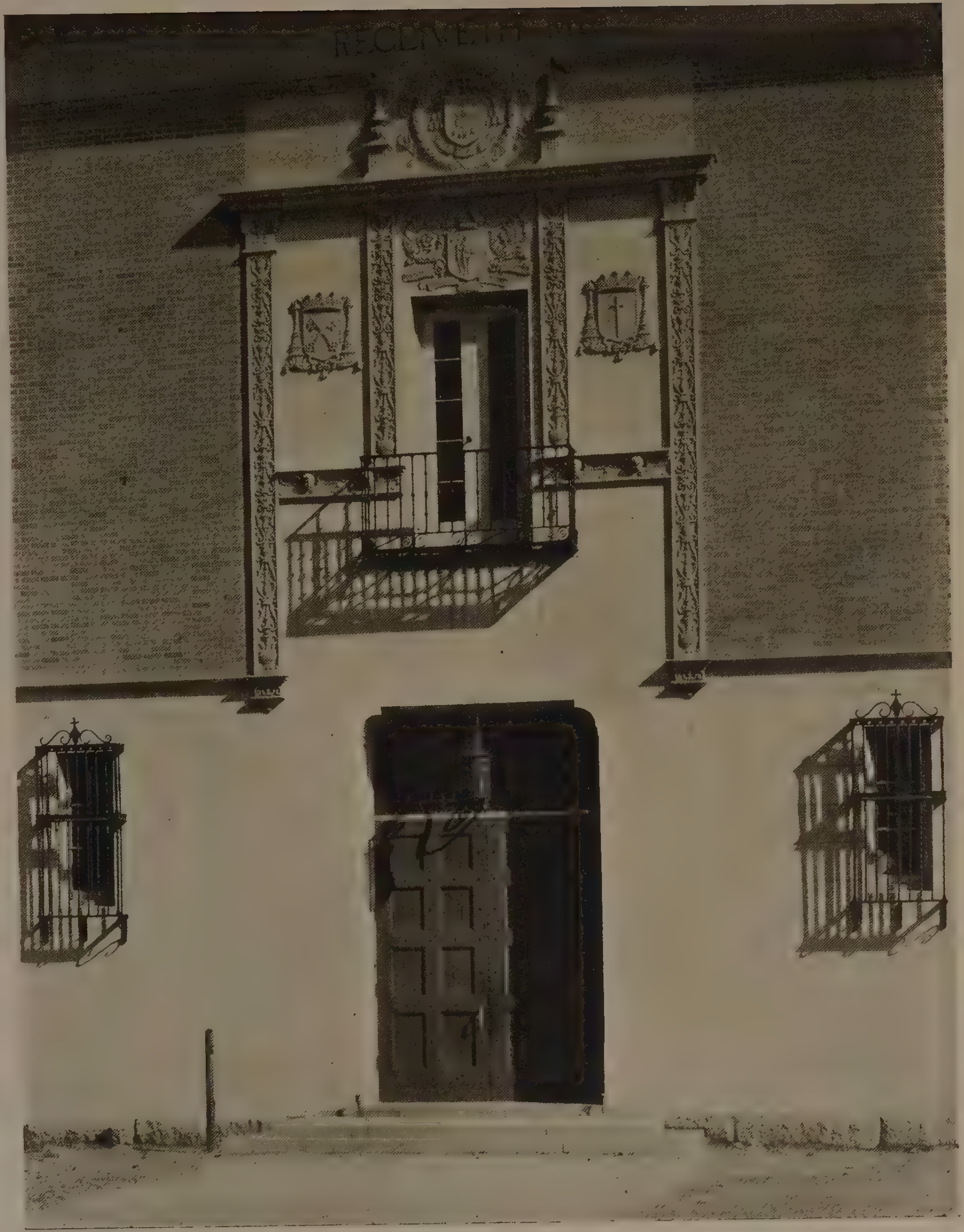
Van Leyen, Schilling & Keough, Architects.

ST. AGNES'S CHURCH AND RECTORY, DETROIT, MICH.

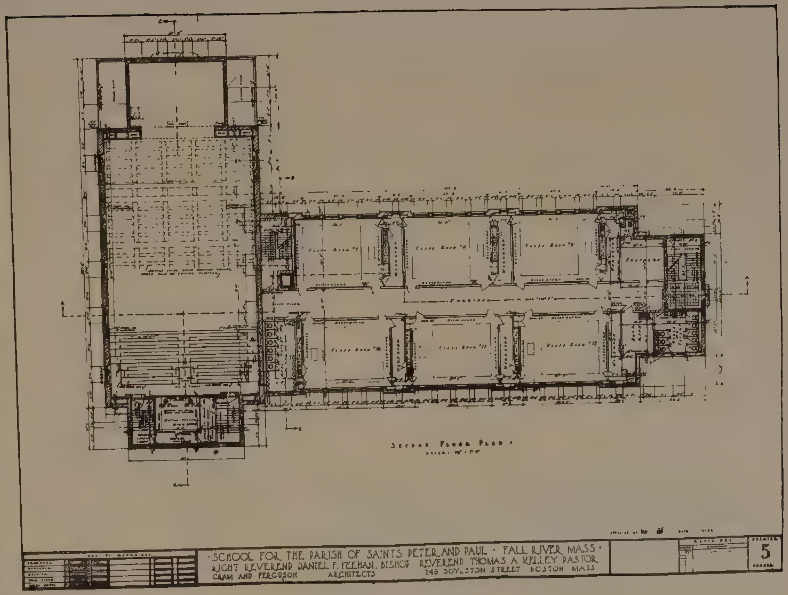


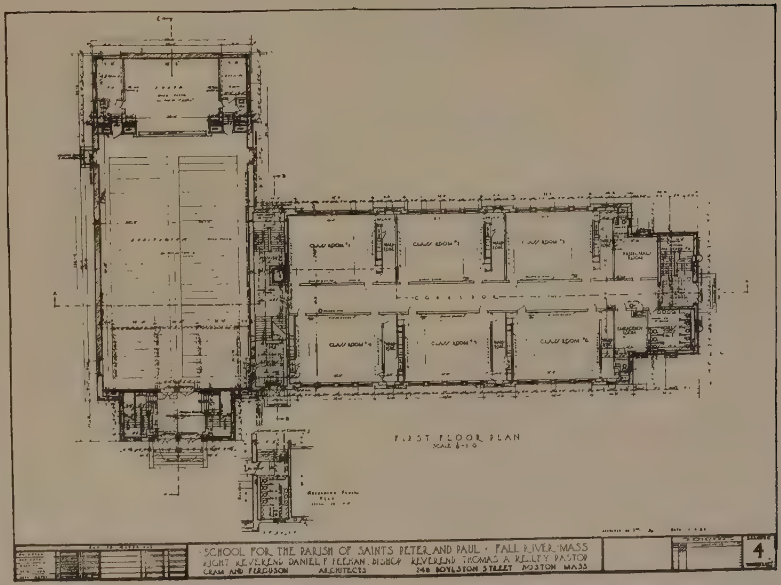
SCHOOL BUILDING FOR THE PARISH OF SAINTS PETER AND PAUL, FALL RIVER, MASS.

Cram & Ferguson, Architects.

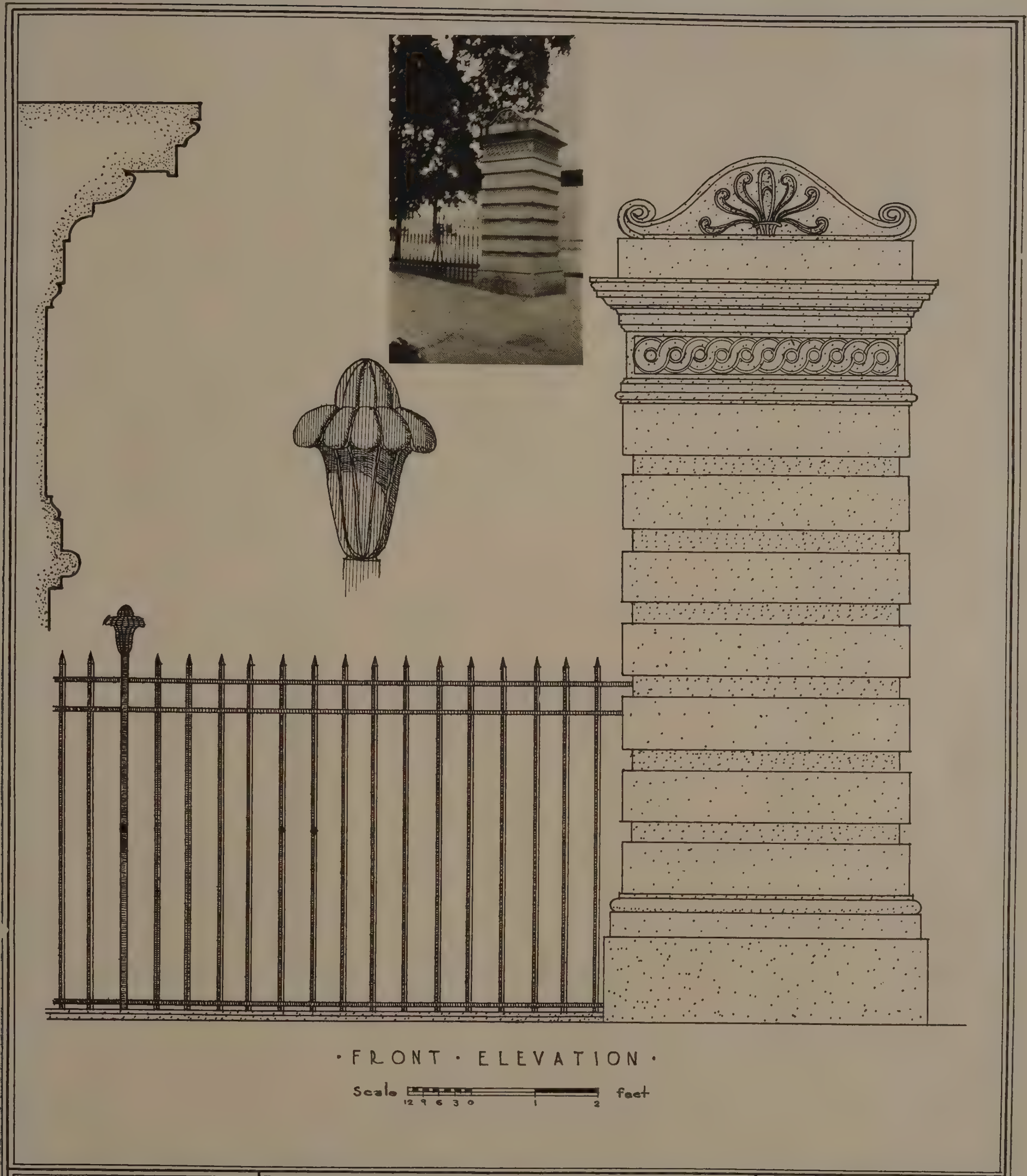


DETAIL, SCHOOL OF THE PARISH OF SAINTS PETER AND PAUL, FALL RIVER, MASS.


SECOND FLOOR PLAN
·SCHOOL FOR THE PARISH OF SAINTS PETER AND PAUL · FALL RIVER MASS·
RIGHT REVEREND DANIEL F. FEEHAN. BISHOP REVEREND THOMAS A KELLEY PASTOR
CRAM AND FERGUSON ARCHITECTS 248 BOYLSTON STREET BOSTON MASS
5


FIRST FLOOR PLAN
CLASS ROOM
·SCHOOL FOR THE PARISH OF SAINTS PETER AND PAUL · FALL RIVER MASS
RIGHT REVEREND DANIEL F FEEHAN. BISHOP REVEREND THOMAS A KELLEY PASTOR
CRAM AND FERGUSON ARCHITECTS 248 BOYLSTON STREET BOSTON MASS
4

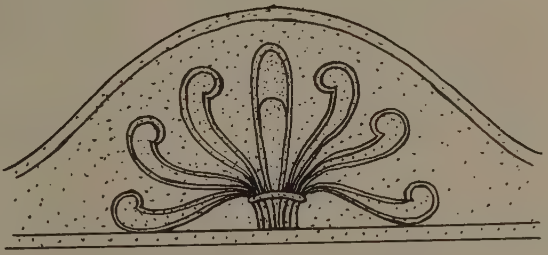
Cram & Ferguson, Architects.



EARLY ARCHITECTURE
OF THE
DISTRICT OF COLUMBIA

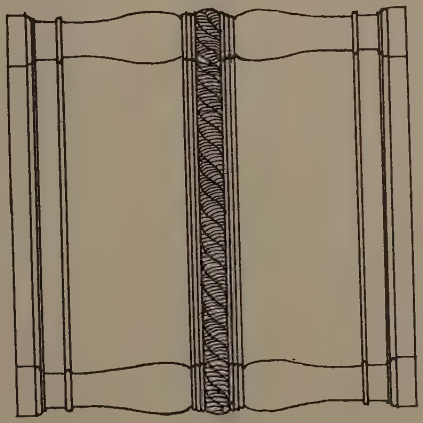
ORIGINAL POSTS & FENCE FROM
-THE U.S. CAPITOL - WASHINGTON, D.C.
·DESIGN ATTRIBUTED TO BULFINCH·
·DATE· CIRCA 1800·

MEASURED, & DRAWN
BY
ALBERT P ERB
WASHINGTON, D.C.

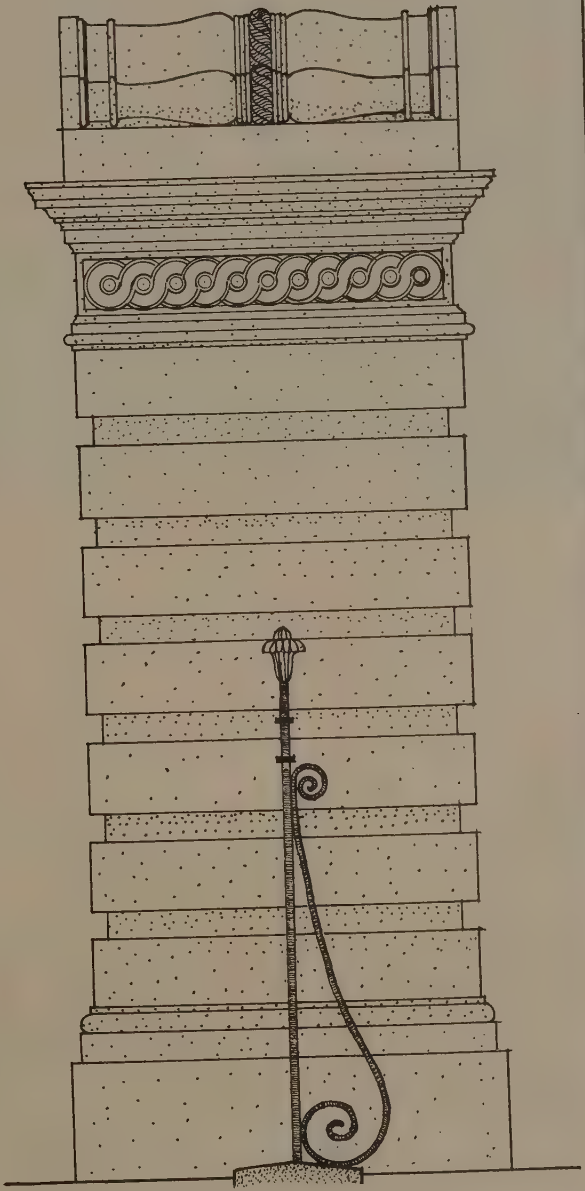


SCROLL ORNAMENT

Scale inches



PLAN OF TOP



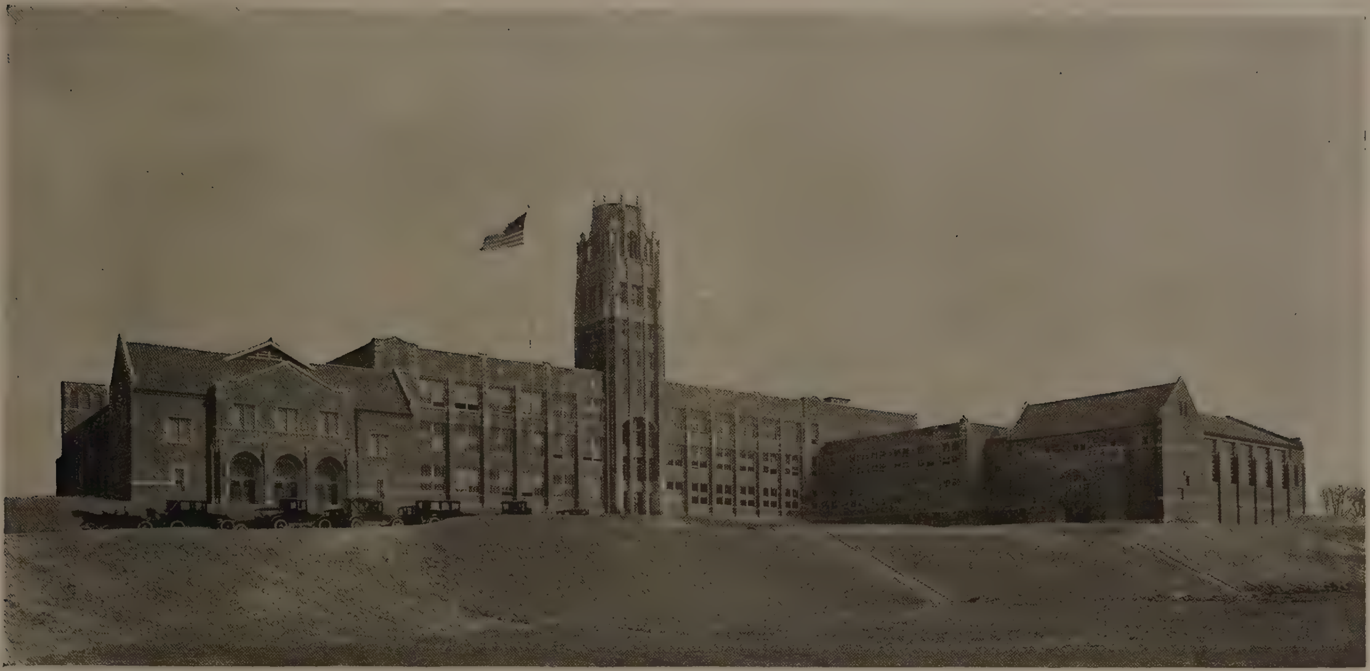
SIDE ELEVATION

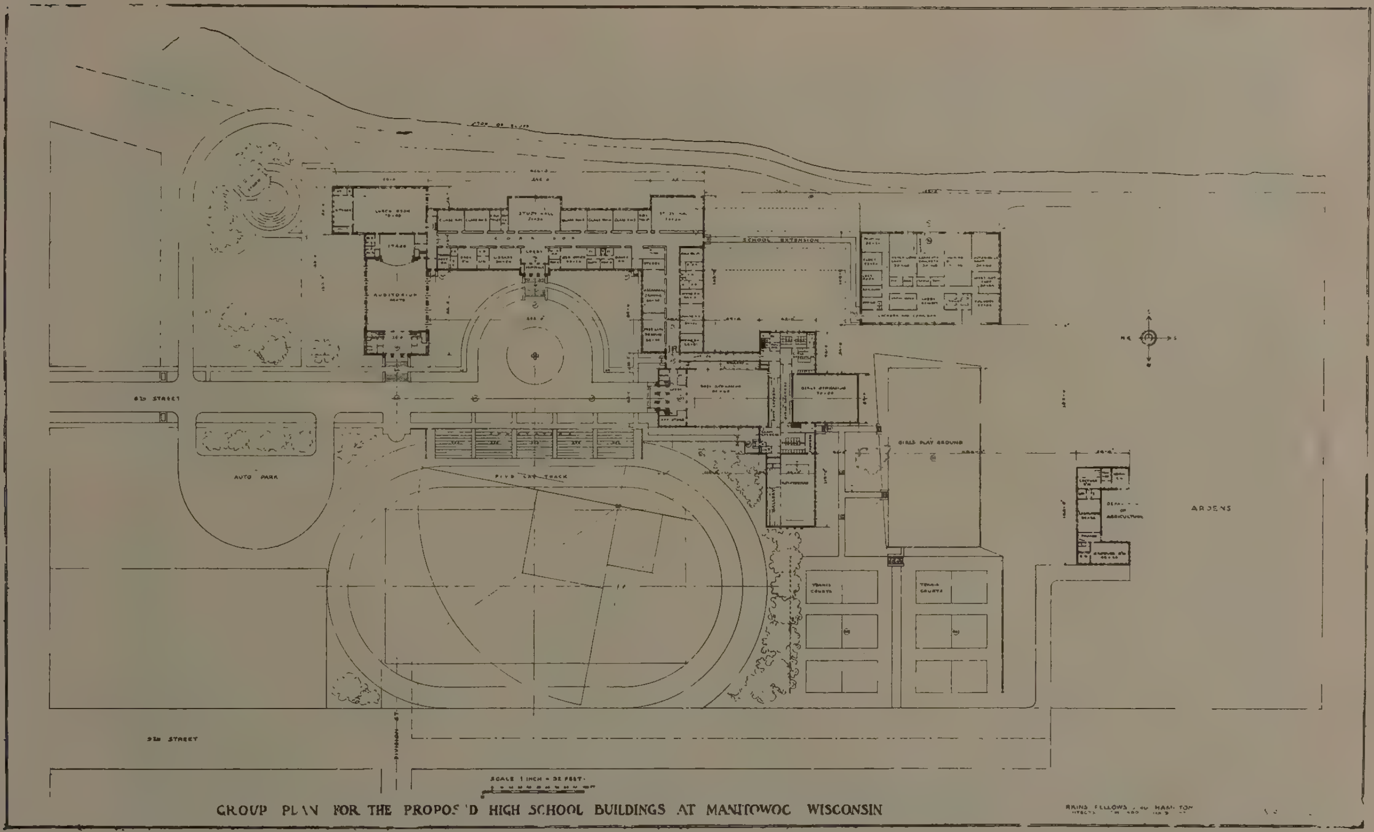
Scale 12 9 6 3 0 1 2 feet

EARLY ARCHITECTURE
OF THE
DISTRICT OF COLUMBIA

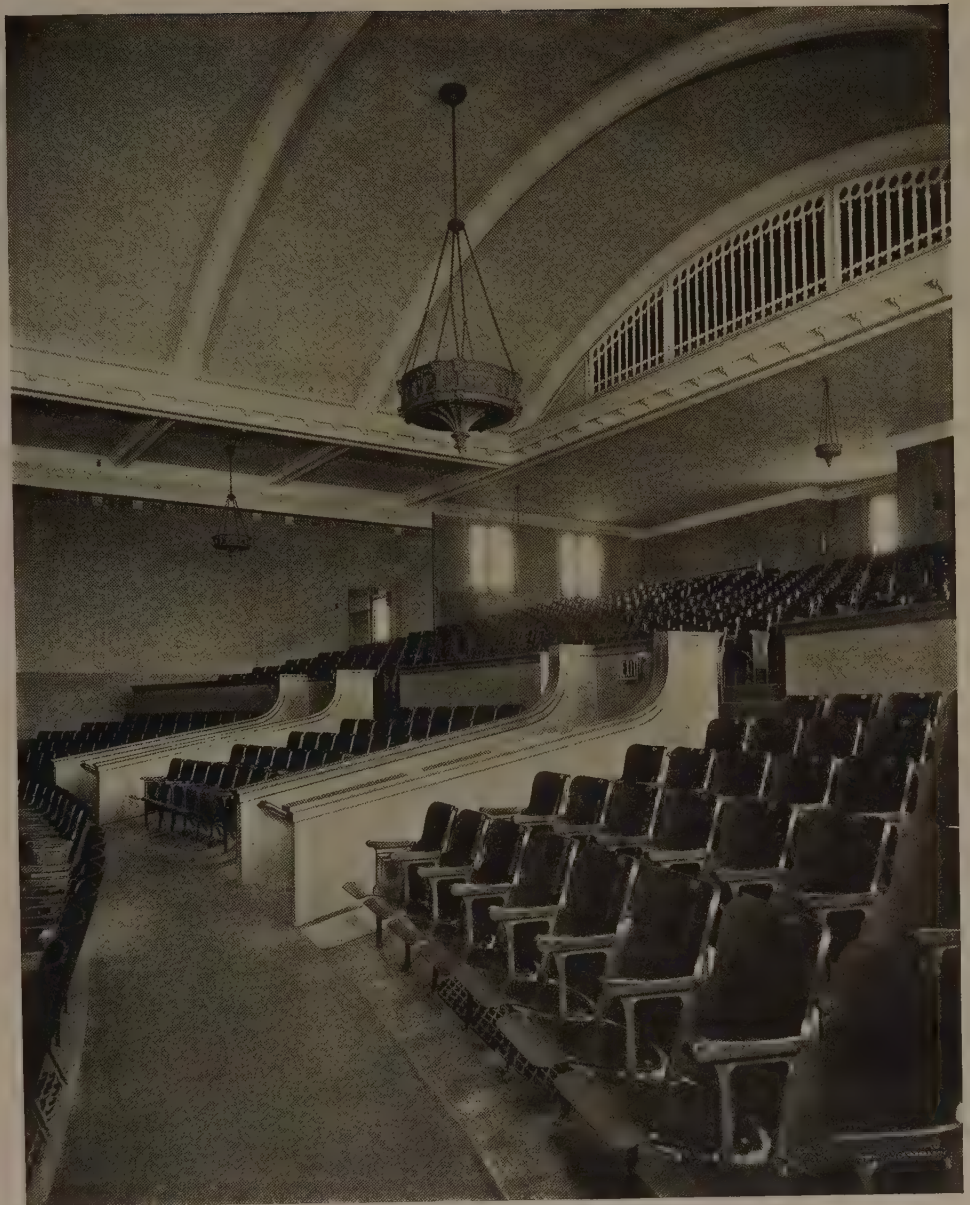
·ORIGINAL POSTS & FENCE FROM·
·THE U.S. CAPITOL WASHINGTON, D.C.·
·DESIGN ATTRIBUTED TO ·BULFINCH·
·DATE· CIRCA 1800·

MEASURED & DRAWN
BY
ALBERT P. ERB
WASHINGTON, D.C.

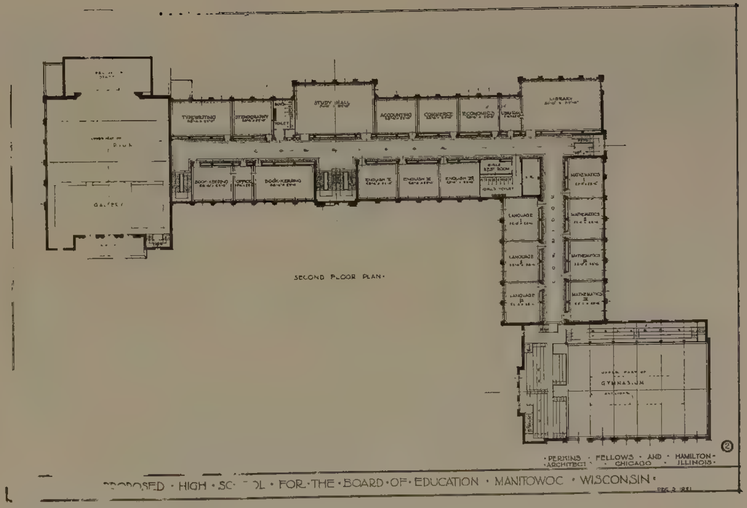


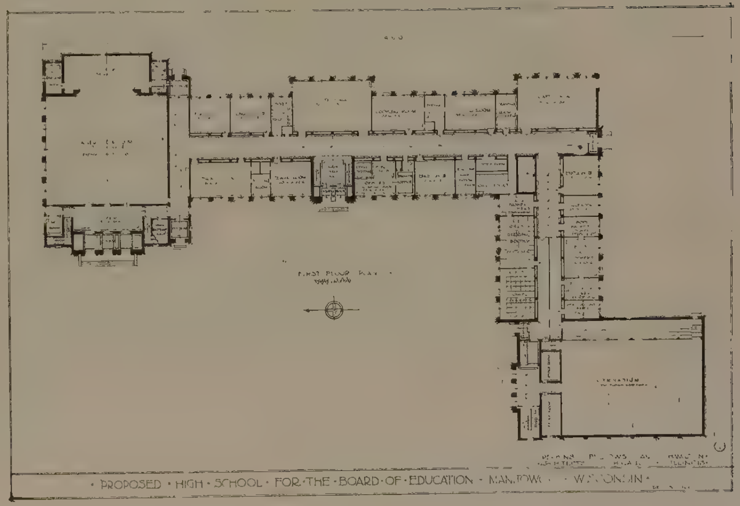


LINCOLN HIGH SCHOOL, MANITOWOC, WIS. Perkins, Fellows & Hamilton, Architects.

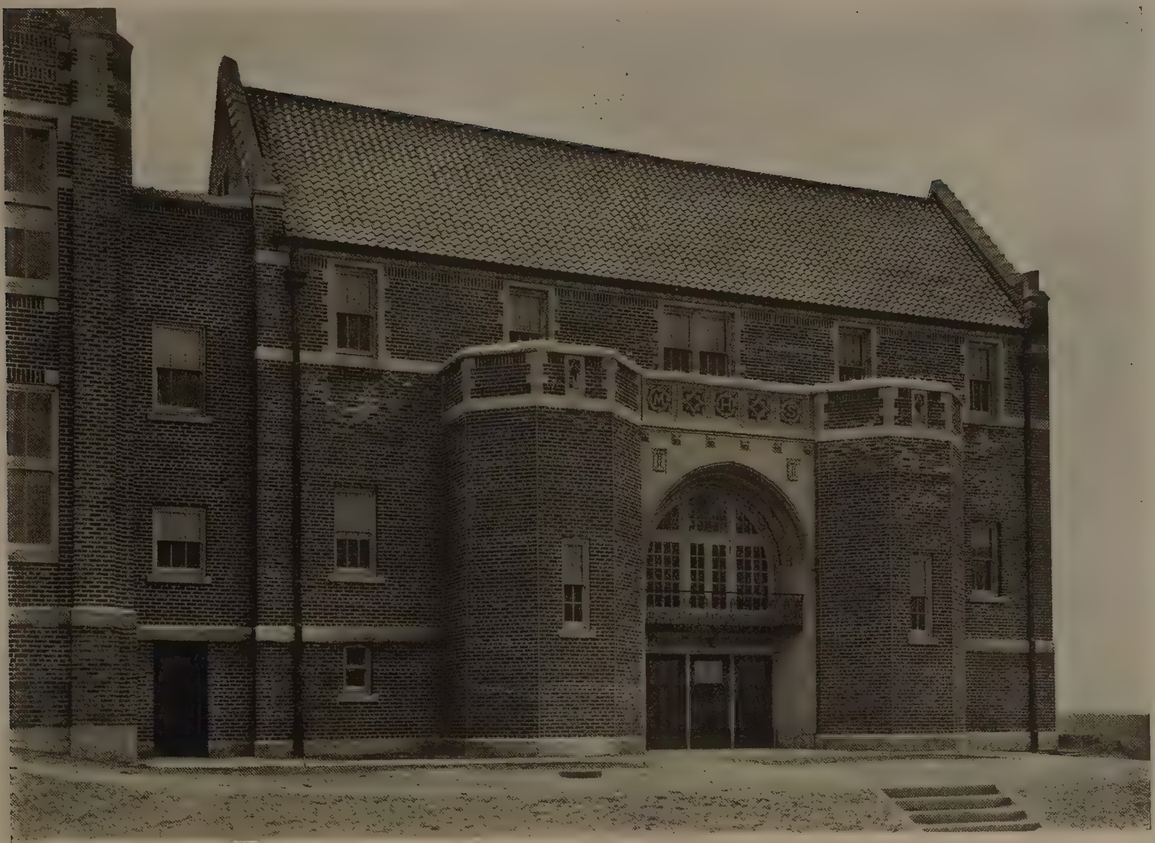


GALLERY IN AUDITORIUM, LINCOLN HIGH SCHOOL, MANITOWOC, WIS.

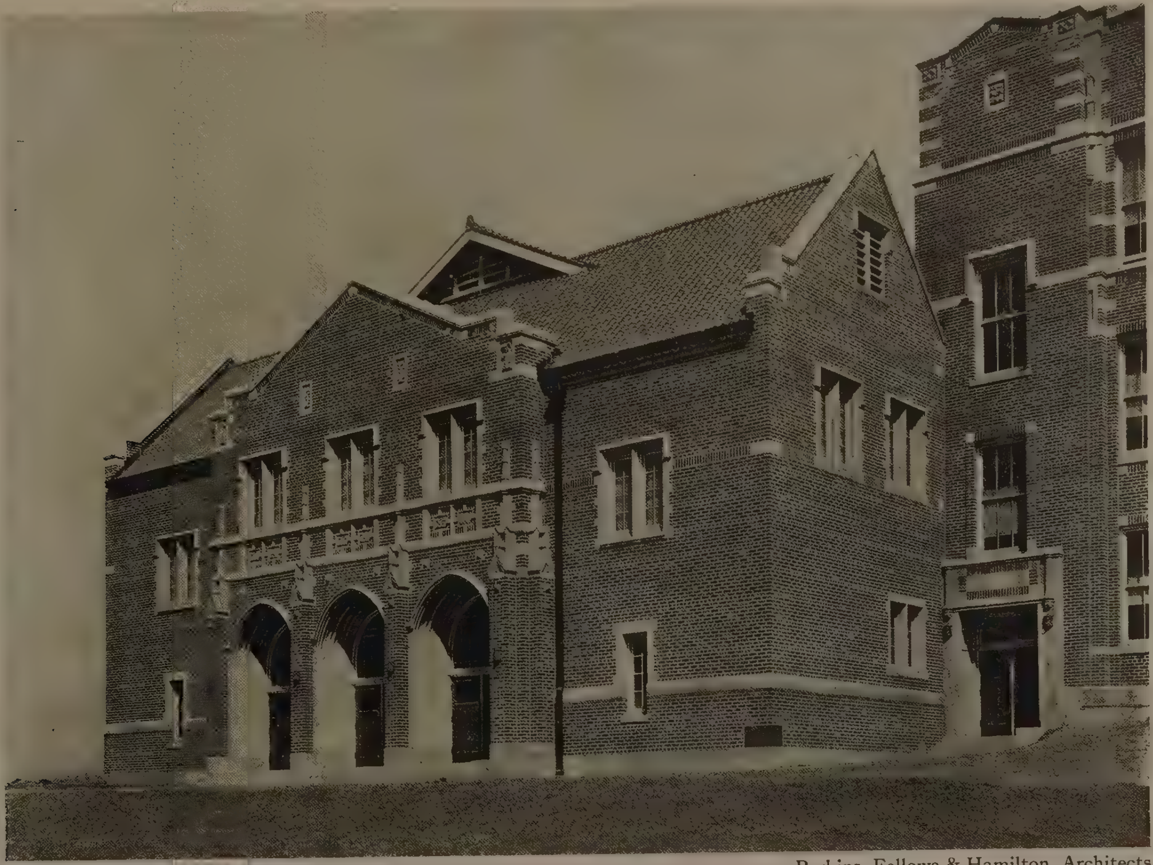



FIRST FLOOR PLAN
GYMNASIUM
· PROPOSED · HIGH · SCHOOL · FOR · THE · BOARD · OF · EDUCATION · MAN TOW · W CONSIN ·

Perkins, Fellows & Hamilton, Architects.



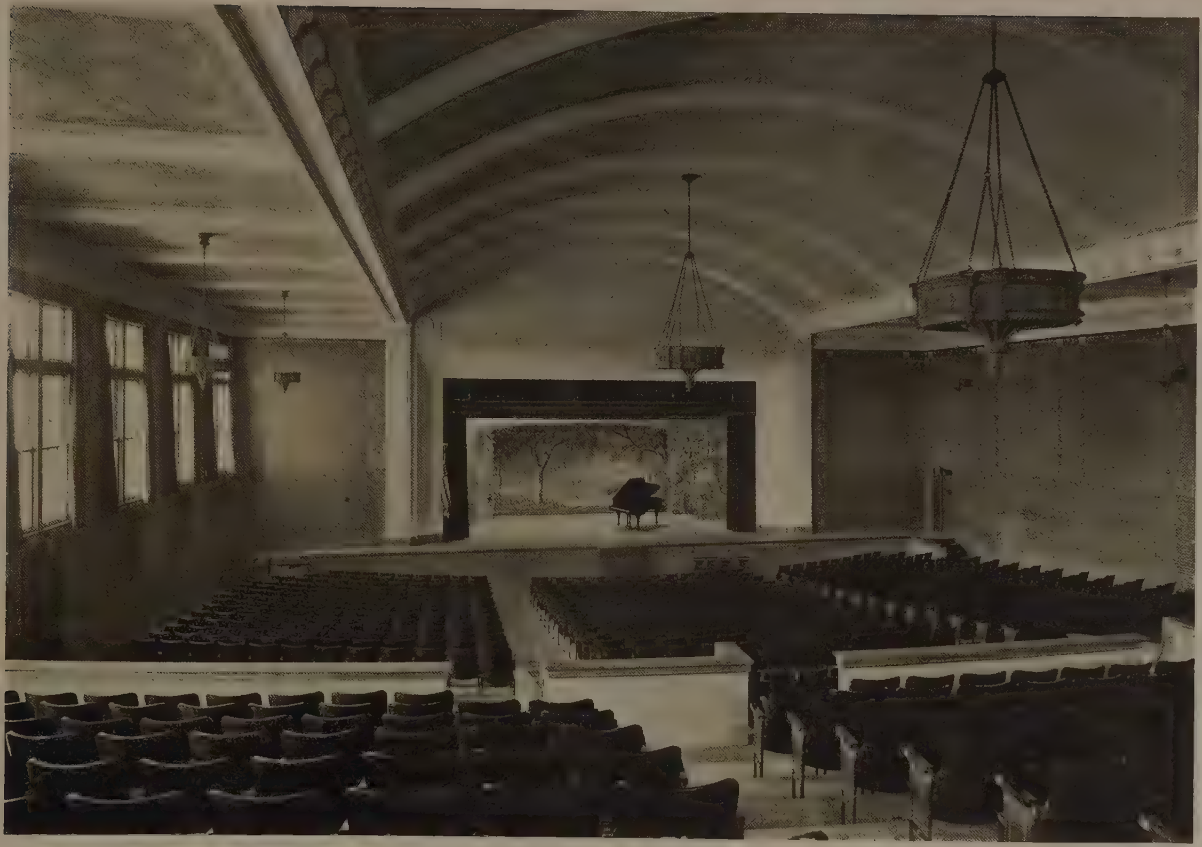
ENTRANCE TO GYMNASIUM.



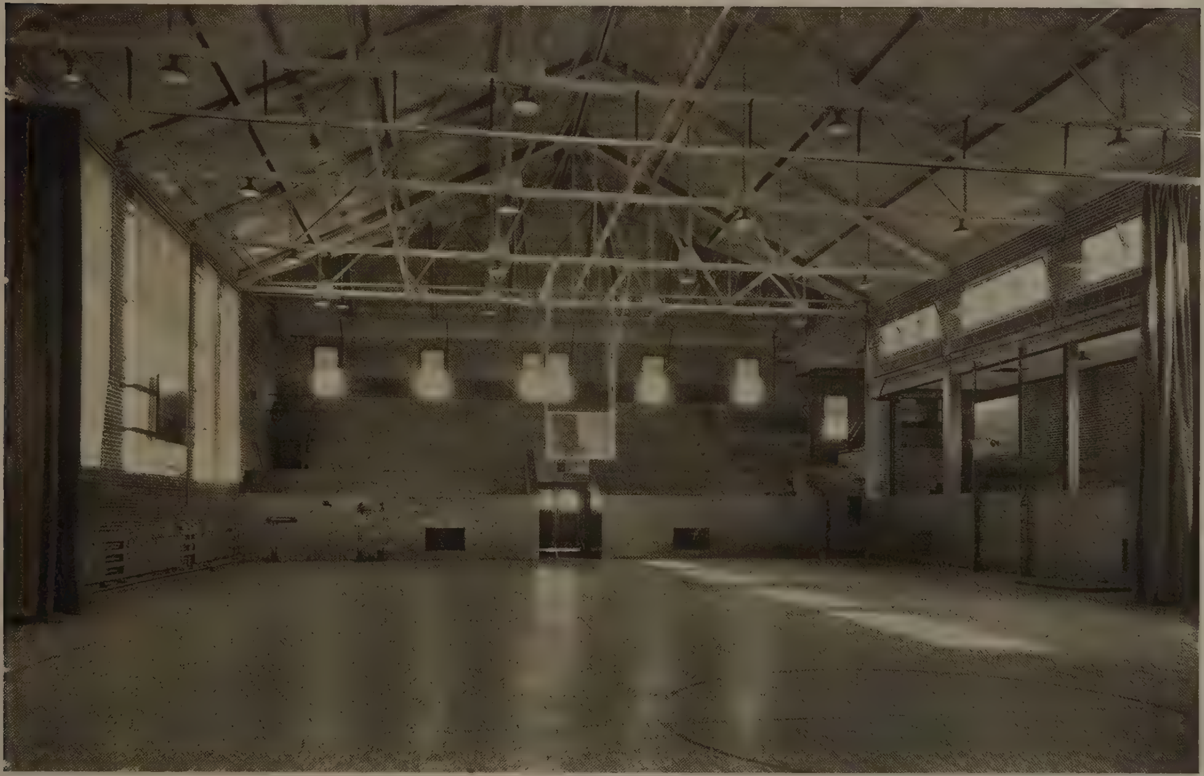
ENTRANCE TO AUDITORIUM.

Perkins, Fellows & Hamilton, Architects.

LINCOLN HIGH SCHOOL, MANITOWOC, WIS.



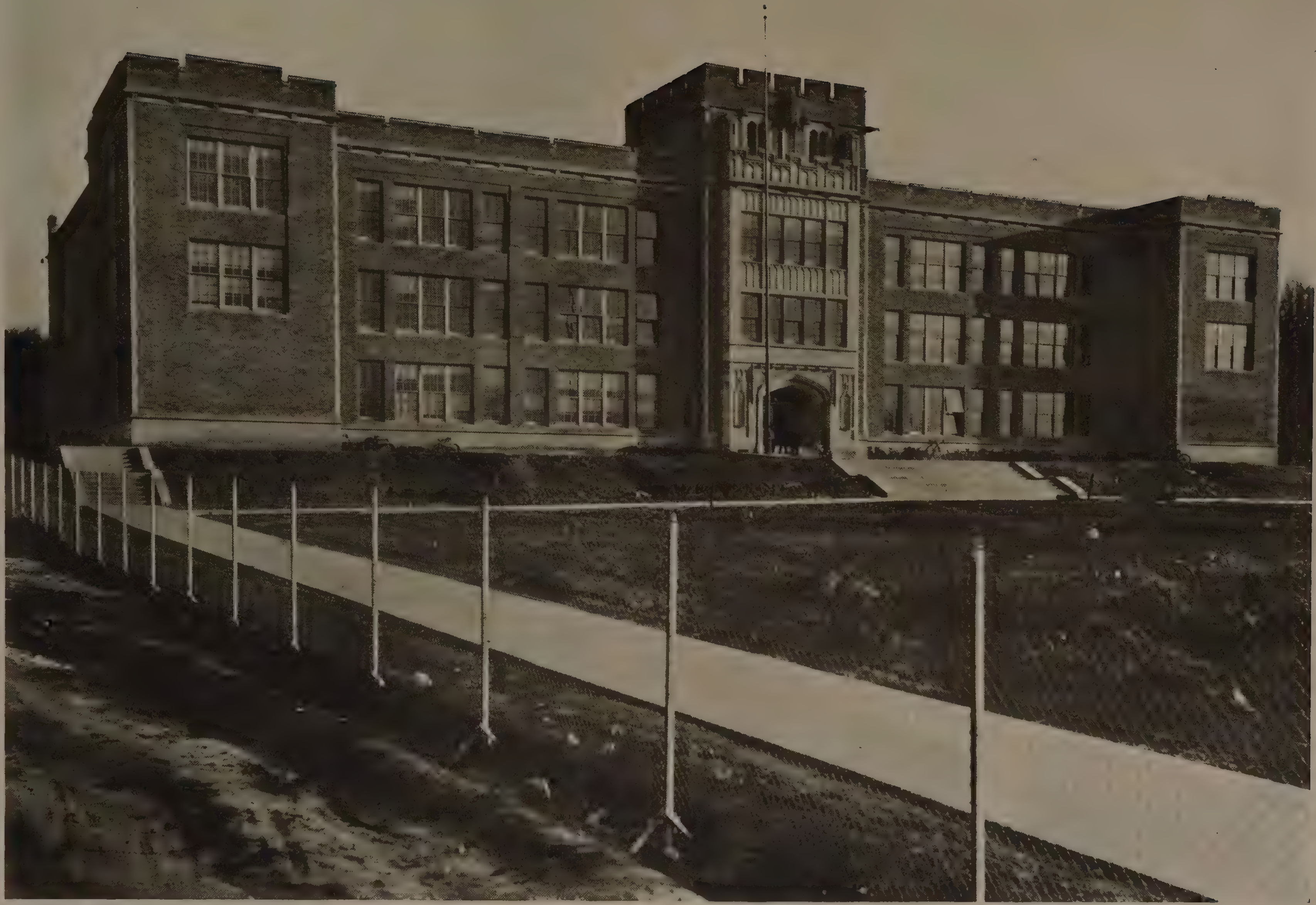
AUDITORIUM, TOWARD STAGE.



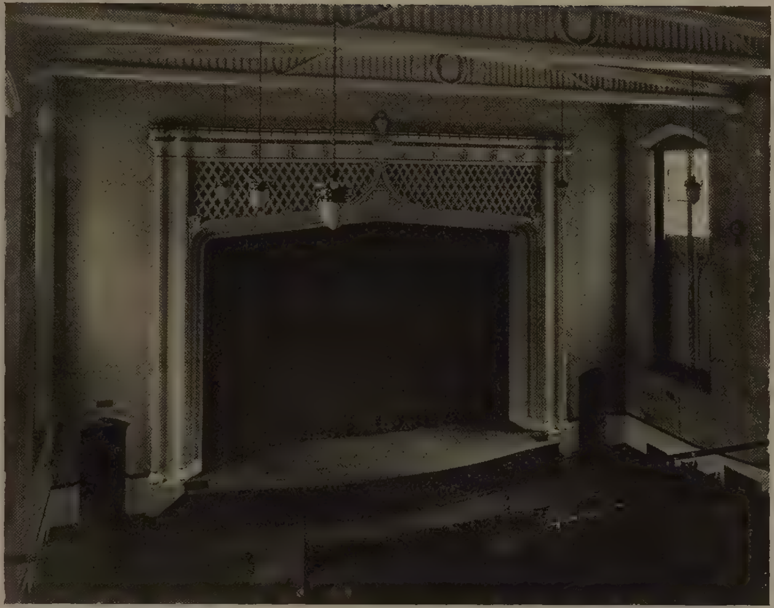
GYMNASIUM.

Perkins, Fellows & Hamilton, Architects.

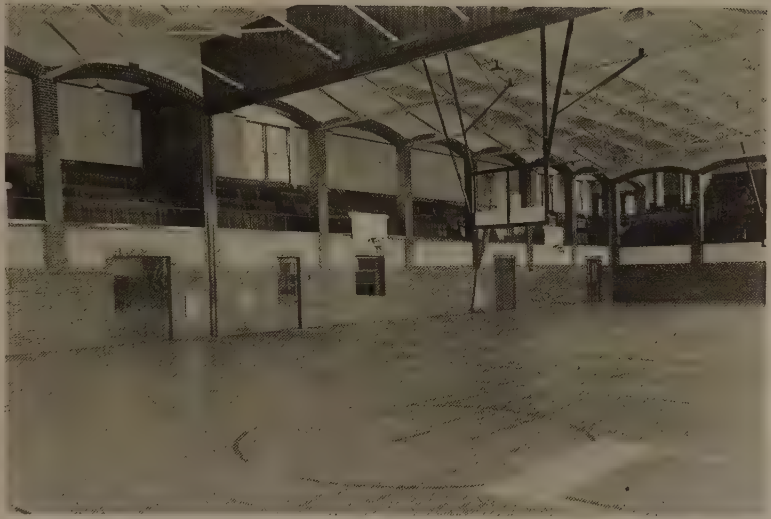
LINCOLN HIGH SCHOOL, MANITOWOC, WIS.



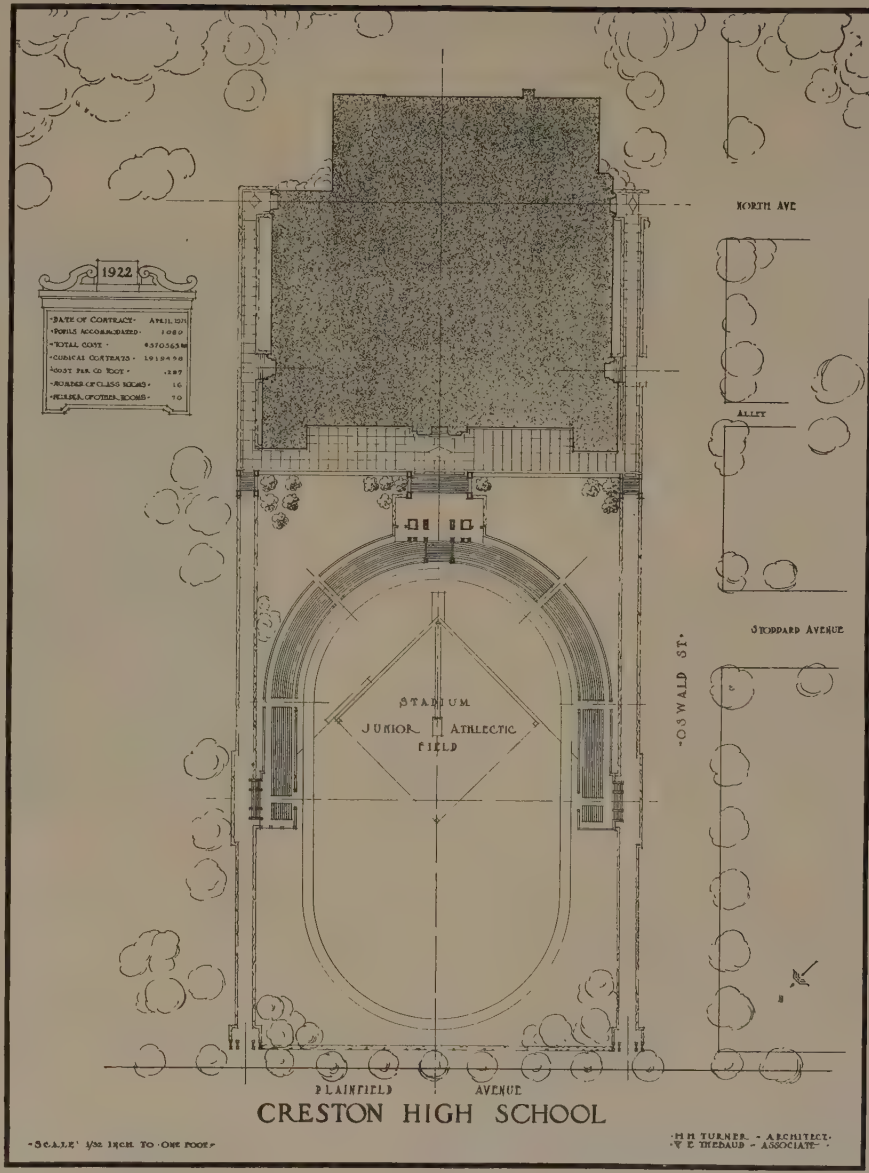
CRESTON JUNIOR HIGH SCHOOL, GRAND RAPIDS, MICH. Henry H. Turner and V. E. Thebaud, Architects.



AUDITORIUM STAGE.



GYMNASIUM. H. H. Turner and V. E. Thebaud, Architects.


1922
·DATE OF CONTRACT· APRIL 1921
·PUPILS ACCOMMODATED· 1080
·TOTAL COST· $370563
·CUBICAL CONTENTS· 1919498
·COST PER CU FOOT· .287
·NUMBER OF CLASS ROOMS· 16
·NUMBER OF OTHER ROOMS· 10
NORTH AVE
ALLEY
STODDARD AVENUE
·OSWALD ST·
STADIUM
JUNIOR ATHLETIC FIELD
PLAINFIELD AVENUE
CRESTON HIGH SCHOOL
·SCALE· 1/32 INCH TO ·ONE FOOT·
·H H TURNER - ARCHITECT·
·V E THEBAUD - ASSOCIATE·

CRESTON JUNIOR HIGH SCHOOL, GRAND RAPIDS, MICH.

The Creston Junior High School

Henry H. Turner and V. E. Thebaud, Architects

THIS building is located in the extreme northern end of the city of Grand Rapids, and is set some 400 feet back from the street line, taking advantage of the peculiarities of the topography in developing the plans.

The building accommodates 720 pupils, but has been planned with the idea in mind of adding classrooms, science-rooms, and shops when the need develops.

Two science laboratories are provided for, with plant-room and aquaria facilities, an apparatus-room, dark-room, and lecture-room. The lecture-room is equipped for projection work.

The commercial-department group of the school consists of a bookkeeping room and a stenographic and dictation room, divided by a double-glazed partition to simplify supervision on the part of the instructor and to isolate the noise of the typewriters.

A feature of the commercial department is the banking counter, which functions as the thrift counter of the school as well as for instruction purposes.

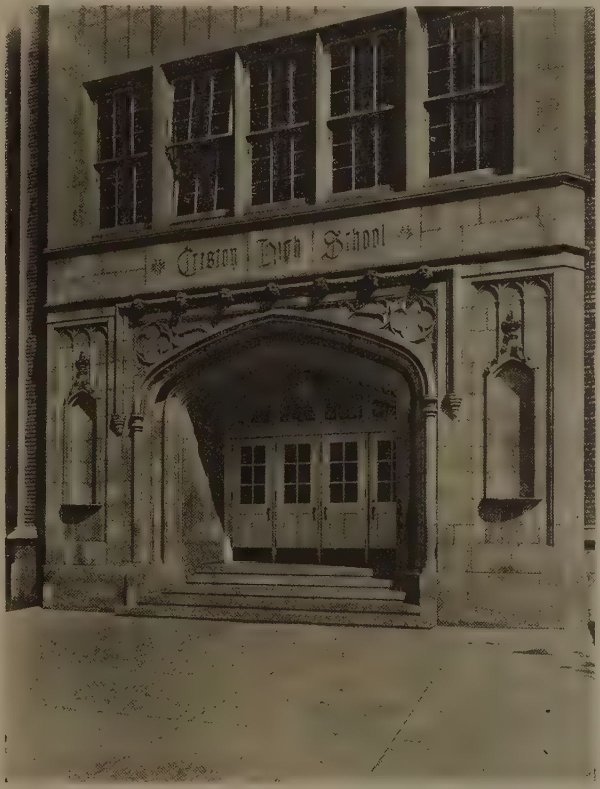
A double unit is devoted to the art department, which is divided with a large free-hand-drawing room, and a room for the art-craft work, with adequate storerooms for the care of materials and plate collections.

The department of practical arts for girls is amply provided for in a group of rooms on the top floor in close proximity to the school lunchroom, so that the head of the department of practical arts for girls can also supervise and direct the preparation of the food to be served in the lunchroom.

The school lunchroom affords accommodation for 300 pupils at one sitting, on the cafeteria plan. Ample provision has been made for kitchen, store-room, and dressing-room, with lavatory facilities for kitchen help. An electric elevator carries provisions and supplies from delivery at the ground floor to the lunchroom kitchen on the top floor of the building.

For the boys' industrial arts, space is provided on the ground floor, most of this space being arranged for top lighting.

Provision is made for a comprehensive wood-working shop, metal-working shop, auto mechanics, and electrical shop, printing and bookbinding, and a mechanical-drawing room. In the main, the space for shops is arranged so that the size of the shop units can be readily adjusted to meet the varying needs of the further development of the junior or intermediate high-school idea.



Main Entrance.

The physical education of the pupils is provided for in two gymnasia, one large gymnasium, 60 feet by 90 feet, and one 45 feet by 60 feet, arranged so that the two can be thrown together on occasion, securing an unobstructed floor space of 60 by 135 feet for competition games between schools. There are shower-baths for boys and girls; lockers, rooms, and quarters for the physical directors arranged in such a manner as to make supervision over the lockers and baths effective. The spectators' galleries for the gymnasia will accommodate 550 to 600 people.

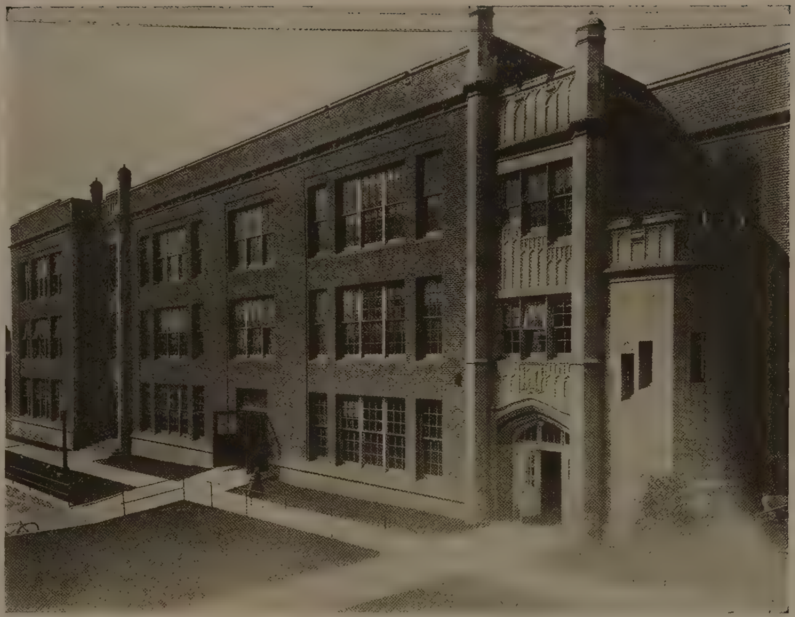
The library consists of two rooms, located on the ground floor adjacent to the main entrance of the building. One of these rooms is equipped as the branch library for this district, with a separate entrance for evening use, so that the library is accessible to the general public as well as the student body. Opening off the branch library is a large room to serve the dual purpose of the reference library, study hall, and upper-grade session room, under the direction of special study teachers.

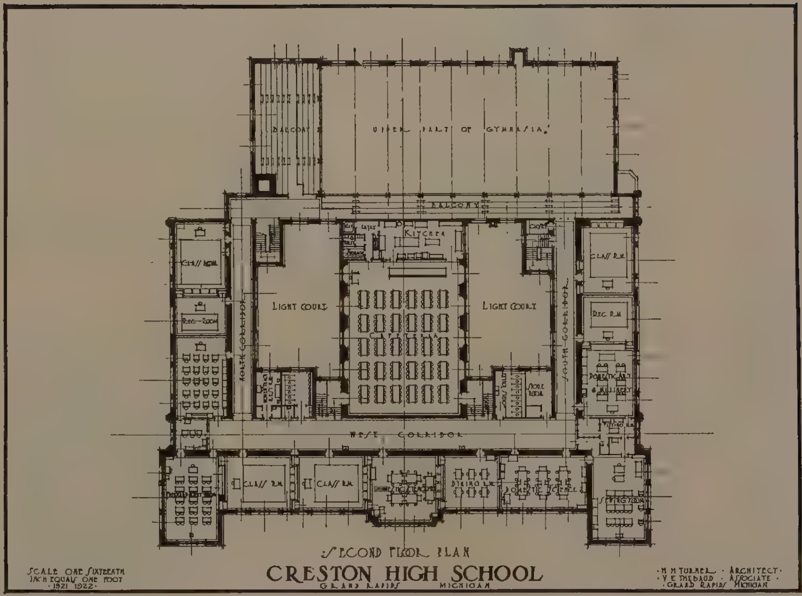
Music and public speaking are arranged for in a large room adjacent to the auditorium stage. This location makes possible the proper correlation of this work with the auditorium facilities for orchestra and chorus work.

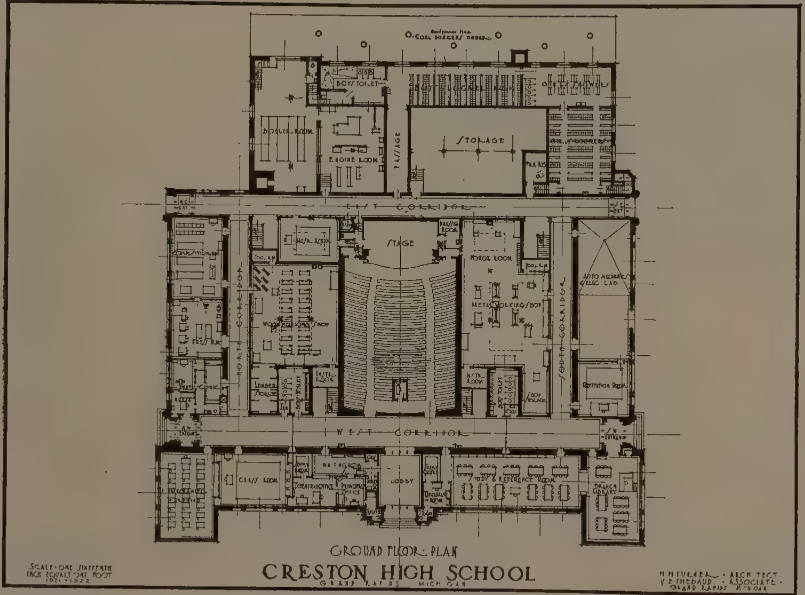
The auditorium has a seating capacity of 800, and is on the ground floor, with a large stage arranged for concerts, school plays, and chorus work. A sloping floor with raised steppings provides adequate sight lines from every seat, and a balcony accessible to the first floor corridor, with a built-in fireproof projection booth, providing a completely appointed auditorium to serve both the needs of the school and the demands of the district for public use.

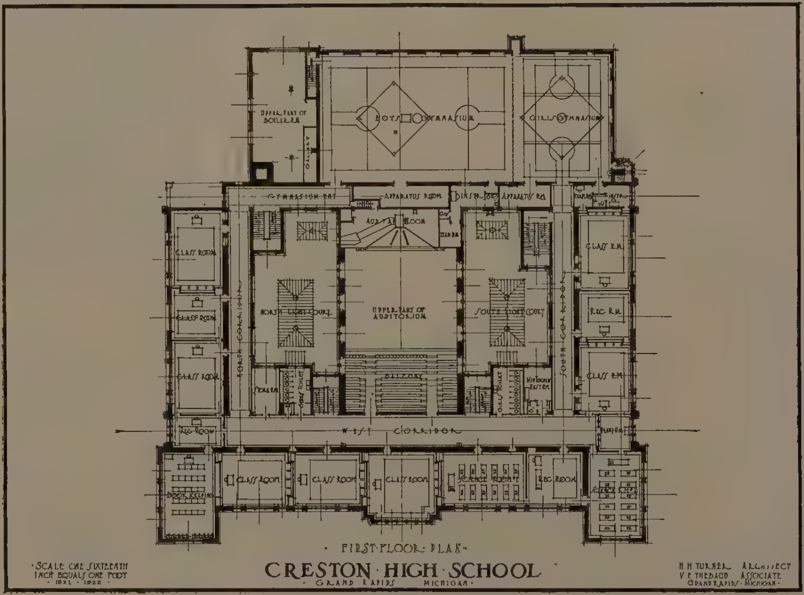
For the administrative quarters, adequate space is allotted in a central location on the ground floor adjacent to the main entrance of the building. Two teachers' rest-rooms, a bookstore, a nurses' room, and a dental-clinic room also have their proper place in the building where they function effectively.

The power and heating plant is located at the south-west of the building, with ample coal-bunker storage under grade for a full season's supply of fuel.









CRESTON JUNIOR HIGH SCHOOL, GRAND RAPIDS, MICH.

Henry H. Turner and V. E. Thebaud, Architects

General view of intake and ship canal.

Electricity and the Architect

By H. P. Allen

THE architect is more than a builder. He is a creator of symbols. As such he must express in his structures the progress of the race. Not only must they serve the purposes for which they are built, but also embody the idea underlying their use.

No force in the making to-day offers more of a challenge to the builder than electricity, the new young giant, which has developed from a remote scientific wonder to everybody's servant in less than half a century. To house the ponderous machines which provide current for industry and the home in buildings that spell power has been the task of the architect in the evolution of the new force. As to how well he has succeeded, the sightly structures which have so largely replaced the shedlike central stations of yesterday will testify.

Fairly typical of the new order is the Chippawa-Queenston development of the Hydro Electric Power Commission of Ontario at Niagara Falls. This plant, which will have a generating capacity in excess of 600,000 horse-power, impresses not only by the daring of the plan behind it, but by its simple, massive lines. They lend beauty to a utilitarian structure. Here is a building that embodies the idea of power, just as the pyramids and the Sphynx symbolize the mysteries of ancient Egypt.

The Chippawa-Queenston development is the largest hydroelectric plant at Niagara Falls; when completed, it will be the largest in the world. At present, when it is furnishing about 330,000 horse-power, it has but one rival for size, a hydroelectric power-house in Sweden having a capacity of 400,000 horse-power.

The idea behind the new development was to get the last available horse-power from the water allotted to Canada under the treaty with the United States for limiting diversion of water at Niagara and preserving the beauty of the cataract. There is a difference of 327 feet between the levels of Lakes Erie and Ontario. The new development uses 305 feet of this as the available head for the first units installed, and 309 for the rest, which will enable the capacity of the generators to be increased in the newer installations. The other hydroelectric plants at the Falls use but 130 to 210 feet of head. This means that although the Chippawa-Queenston development has cost the people of Ontario more than $70,000,000 to date, it will spell economy in the end. Water, for power purposes, is going to be more precious as the years pass by.

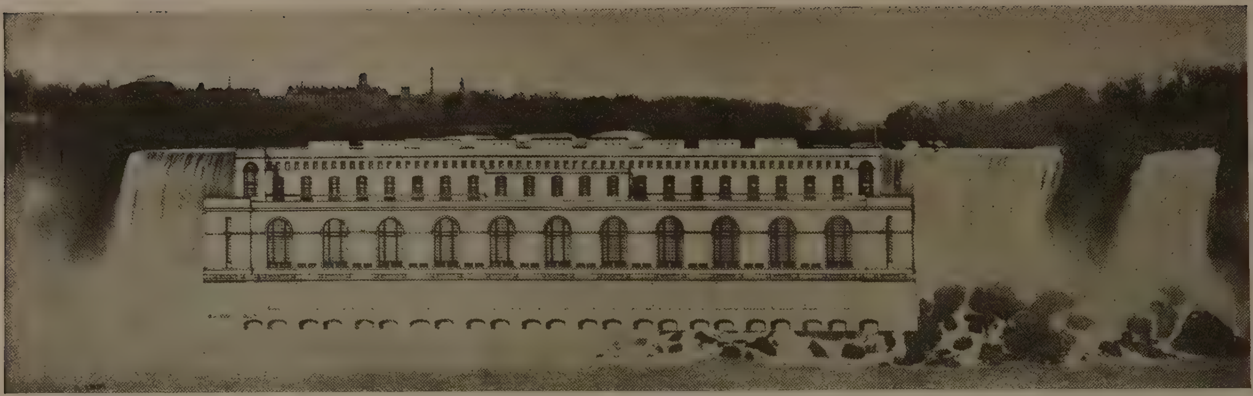
To make the development possible, the current of the sluggish little Welland River, which joins the Niagara about a mile above the Canadian falls, has been made to flow the other way than nature intended for about four miles; a whole countryside has been turned upside down to build a canal eight and one-half miles long, and the majestic Niagara cliff pressed into service.

It cannot be said, even by the hypercritical, that the new power-house detracts to any great extent from the beauty of the Niagara gorge. Somehow the building fits, even to the concrete-covered penstocks and the steel towers which carry the high-tension wires over the edge of the cliff.

Crowning the Niagara escarpment about a mile from the General Brock monument is the screen-house, marking the terminus of the twelve-mile canal. It is a long, narrow building, done in the pleasing style now common to the newer power-houses—tall windows, rounded at the top, straight lines everywhere else, and a paucity of ornamentation. The architect has achieved here, with a few simple lines, an effect that gets away from monotonous squareness to a remarkable degree.

The power plant itself, where turbines and generators are located, together with the giant transformers and a bewildering array of auxiliary machinery, is at the foot of the cliff. It is carried out in the same pleasing architectural lines as the screen-house. It is a stupendous hieroglyph of the resistless power of the forces of nature, tamed and made subject to the uses of man. It is an embodiment of the dynamic spirit of a new age, born in a New World and worked out in a new way with new materials.

When completed the power-house will be 700 feet long. Its height is 160 feet, or slightly less than that of the Horseshoe Falls. It will house ten vertical alternating-current generators, varying in capacity from 55,000 to 70,000 horse-power, directly connected to single-runner turbines. Although these machines are towering structures, as dynamos go, standing 26 feet 10 inches above the generator floor, it is not so much the size of them that requires so large a building to house the power plant as the tremendous amount of



General view.

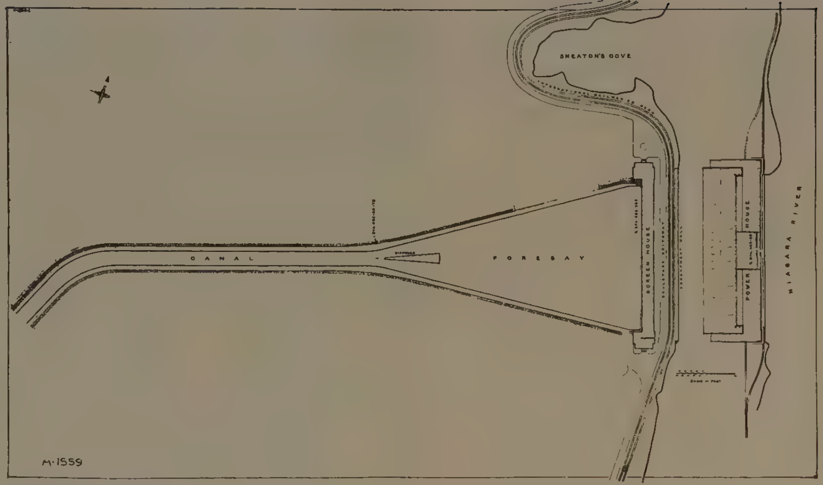
Canal through central gate.

1920
219 [illegible] looking N under M.C.R.-G.T.R. Bridge. Oct. 8. 1921.

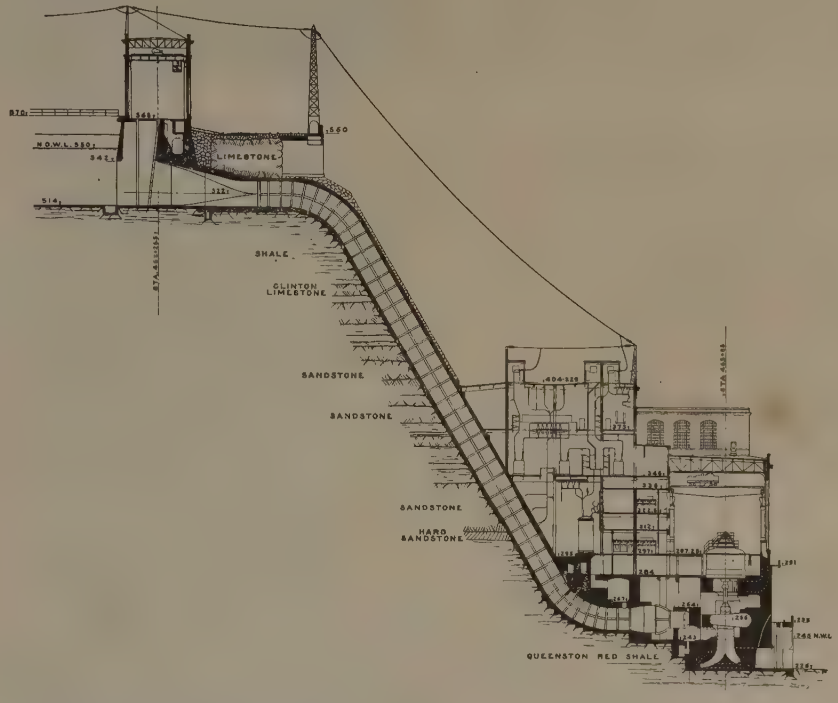
auxiliary machinery needed. In addition, room is provided for elevators, hospital, kitchen and dining-room, and various offices and storerooms. To supply current for the auxiliary machinery a 2,800 horse-power dynamo is required. Two of these machines are in place, and they are no small affairs, though they look like toys beside the big units. One of the auxiliary dynamos would supply the ordinary electric needs of a town of 10,000 people.

The 55,000-horse-power generators extend through three floor levels of the power-house. Thrust bearings, supporting frames, and the direct-current exciting dynamos show above the main floor. On the next floor below are the stator-frames and coils, with the ponderous rotors inside. The next floor below gives a view of the rotors. The huge guide bearings which keep the 30-inch shafts from swinging from side to side are on this level. The turbines are on yet another floor below, beneath which are sump pits.

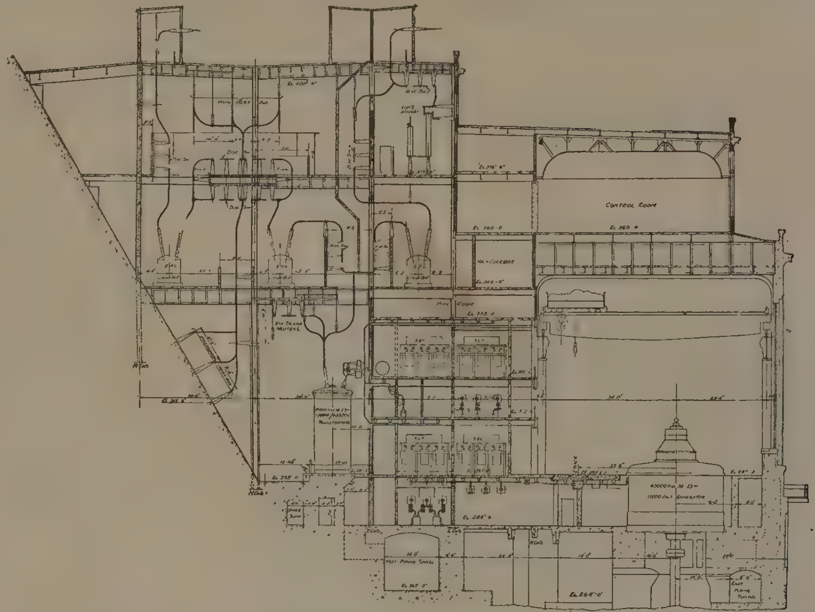
Above the main floor are several levels devoted to transformers, oil switches, offices, and the like, although the space immediately above the big generators rises clear to the roof and serves as a craneway. The switchboards, from which the generators and turbines are controlled, are on the top floor. The control of six machines centres in one room, with only two operators required on watch. Their instruments tell them everything that is going on as the big dynamos run, even to the temperature of the coils.



General plan of development.

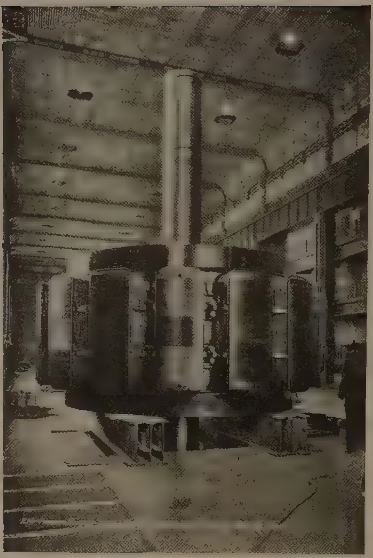


Cross section screen house and power house.



Section power house.

HYDRO-ELECTRIC PLANT, NIAGARA FALLS.



Generator rotor.

Below the main floor small chambers are partitioned off for each machine. This provides for cooling the dynamos. Air from the river level is drawn into the lower chambers, from whence it passes out through the slotted frames of the stators, impelled by centrifugal force. Blowers in the stator chambers send the air through shafts to the roof in warm weather. In winter the heated air is turned into the power house.

The main thrust bearings of the big machines are built to support 1,000,000 pounds. They bear the entire weight of the rotors, 615,000 pounds, the shafts, and the downward pressure of the water on the turbine runner blades. The weight of air necessary for cooling each machine will equal their weight, 1,400,000 pounds, every two and one-half hours. This is at the rate of 120,000 cubic feet a minute. The generator speed is 187.5 revolutions a minute. It is maintained by centrifugal governors, which are belted to the main shaft. The gate control at the turbines is hydraulic.

Current is delivered by the dynamos at 12,000 volts, three phase, 25 cycles, and is stepped up to 110,000 volts for transmission. The current goes to Toronto, Hamilton, London, and more than two hundred other towns in Western Ontario. The longest line is to Windsor, on the Detroit River, two hundred and forty miles from Niagara Falls.

To serve the big machines, cool and oil their bearings, start them and stop them in case of need requires an enormous amount of machinery, every piece of which is in duplicate. Oil pumps, water pumps, and air compressors are necessary. The oil is constantly filtered. All water used is filtered and treated to keep it from rusting the many miles of piping. One of the interesting details of the oil treatment is the use of cream separators to remove grit.

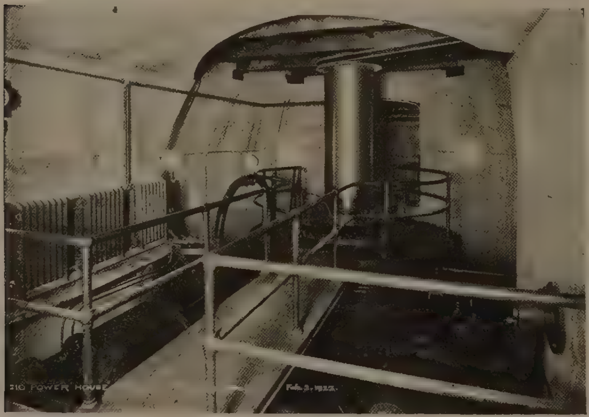
View of generator room.

Except for the steel columns supporting the cranes, which serve the generators, the entire building is done in reinforced concrete, with hollow tile used for some of the minor partitions. The power-house is as near fire-proof as can be made, a necessary precaution where electricity is concerned. There are two travelling cranes in the main generator-room. They can handle a load of 600,000 pounds.

But the power-house, vast as it is, is only a small part of the whole development. From the canal were excavated 12,000,000 cubic yards of earth and 5,000,000 cubic yards of rock. This mammoth head race is 48 feet across, of nearly the same depth, and lined with concrete to prevent frictional losses and allow the passage of the maximum amount of water. The lining represents the pouring of 500,000 yards of concrete. The penstocks which carry the water from the forebay to the turbines, one for each unit, are of steel, 16 feet in diameter, and are covered on the outside with concrete.

Elaborate precautions are taken against ice. At the Chippawa intake concrete tubes run out into the river below the level at which ice runs. Such as may form in the canal and forebay is diverted by a boom and conducted over the cliff and beneath the power-house into the lower river through a 10-foot concrete ice-chute.

All in all, the Chippawa-Queenston development represents the best in engineering practice. And it is comforting to note that the architectural features have been designed with a view to the eternal fitness of things. It must be remembered that the Ontario plant is but a pioneer in the hydroelectric development of the America of the future. The age of electricity is only now dawning. What an opportunity for the architect in the vast projects to come!



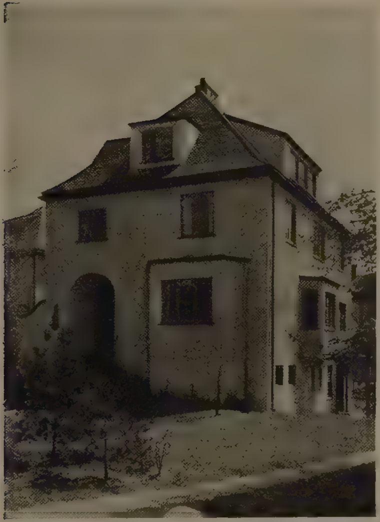
Turbine dock.

Scroll case and valve assembly.

House of Edward T. Sanderson, Architect, at Wellesley, Mass.

THE problem: To locate in a desirable neighborhood, near the station and civic centre, yet without spending all available funds on the lot. This clearly required building in height rather than in breadth.

The solution: An irregular-shaped lot, steeply sloping and restricted in size (the real-estate man's horror), tucked in back of other houses, near the highway but discreetly sheltered by it, and only three minutes from the square, or "Ville," as the college girls call it, the centre of collegiate activities. Wellesley had been decided on for family reasons. To the average passer-by, if he saw it at all, which was not likely, the lot would have appeared little better than a dump, requiring at best an enormous amount of filling in before building operations could even be contemplated.



House, Edward T. Sanderson, Wellesley, Mass.

The architect, however, seized upon these apparent disadvantages and turned them to account. The scheme grew out of careful consideration of grades and surroundings, with due attention to prevalent winds, etc. Three brick steps before the entrance and five more under the arch place the first story well up, without the appearance of undue height. This, together with the slope of the land, which is fortunately toward the south, enables the architect-owner to manage a small three-room-and-bath apartment underneath the dining-room and kitchen at the back, and on a level with the cellar. This is entirely separate, with its own entrance; and being never vacant in a college town goes a long way toward paying for the upkeep. It is also invisible from the approach on the north side, whence the house appears to be of the conventional two-and-a-half-story type.

As a colonial house was out of the question, inspiration came from abroad. To an informal treatment the steep roofs (thirteen and a half inches in the foot) give character, and add appreciably to the attic floor space. The front door, recessed between telephone and coat closets, admits of an entrance-porch without projecting beyond the building face. The archway, be it noted, is not a true semicircle, but a free-hand curve, laid out on the job, as the carpenter was putting up the scaffolds. Its sides are splayed, while an interesting iron lantern relieves the severity, and with its green glass adds a romantic touch by night.

For the sake of economy, exterior woodwork where possible was eliminated. Window frames are devoid of moldings; their plaster reveals come within a half-inch of the sash. Over them plaster hoods, borrowed from Bermuda, give a slight shadow and protect the tops of the casements from rain. No double-hung windows, except those in the "Midget" and over the kitchen sink, were used. Much of the difficulty inherent in casements was overcome by not pairing them. Each has its own frame, thanks to the mullions, which could be made thin as none is over four feet high. All are of the same width, twenty-one and one-half inches, with panes nine by eleven inches, which adds to the uniformity of the whole.

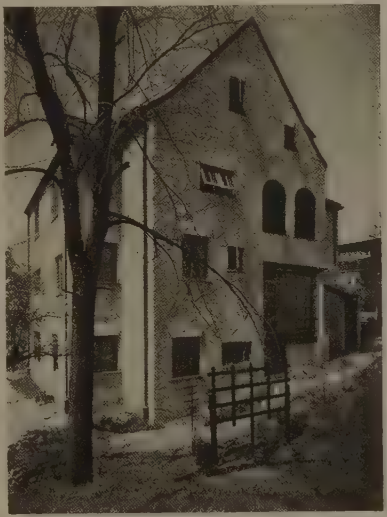
A cypress gutter, however, was decided on. This, as may be seen, although free standing is placed close to the walls, eliminating a cornice. To offset any harshness of effect, a slight easement in the roof is employed. The roofing material itself is a tapered variety of asphalt shingle, nearly black and small in size. They have weathered to a varying sheen, producing an effect not unlike that of slate; have, in fact, been taken for slate by the neighbors. Decks, flashing, and conductors are of copper.

The second-story porch, back of the arcade, is an interesting feature, treated like a mezzanine, three steps below the floor level, and accessible from the stair-landing. This insures privacy, being neither of the first nor the second floor, and contributes to the picturesqueness of the exterior. It also enabled the architect to install a little den over it, under the eaves, in what would otherwise have been waste space.

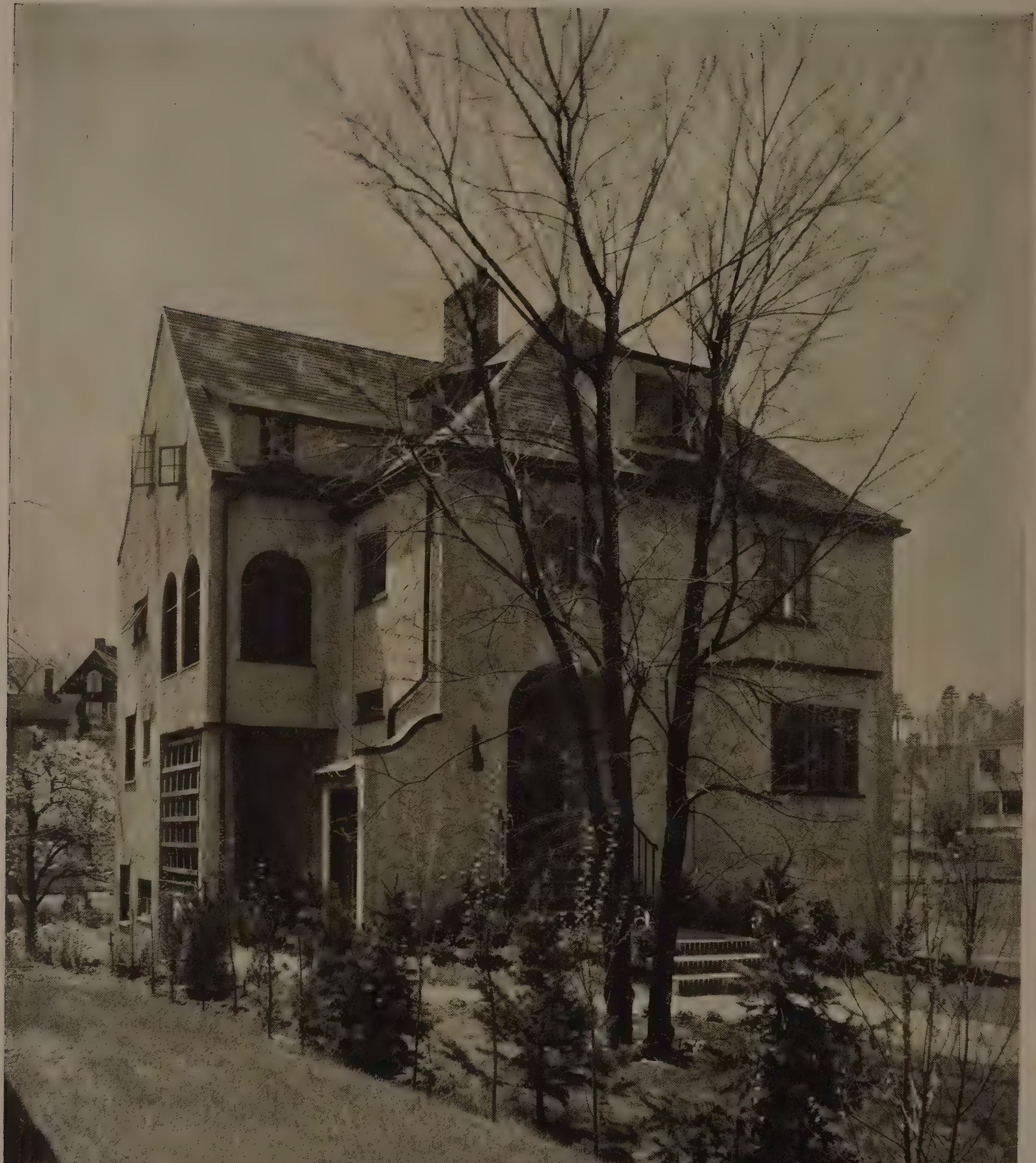
The smallness of the casement prevents the screens, hinged on the inside, from becoming unwieldy; but the lighting is fully adequate, due to the fact that the sills are placed high and the ceilings are kept down to seven feet, eight inches. Shades are conveniently placed between sash and screen.

The plastering likewise deserves passing mention. Dry color was added to the mortar, and the walls throughout, except in kitchen and baths, show a rough scoured finish, rather coarser than is customary. By day they have a pinkish tinge, but vary in varying lights; by night they have that rare quality of being indefinable. The ceilings likewise are tinted. The whole effect has a mediæval touch in character with the architectural treatment, and forming a sharp contrast with colonial interiors common to this part of the country. This is borne out in the high wood wainscot and balusters of stair-hall and the unpainted oak trim of the living quarters.

As no one realizes better than architects that real economy in bathrooms—expecially in regard to service—is secured by procuring the best of plumbing fixtures, no expense was spared in this respect. Inset tubs, tile floors, and walls of hard plaster with scoured sand finish and five-coat work are found throughout.

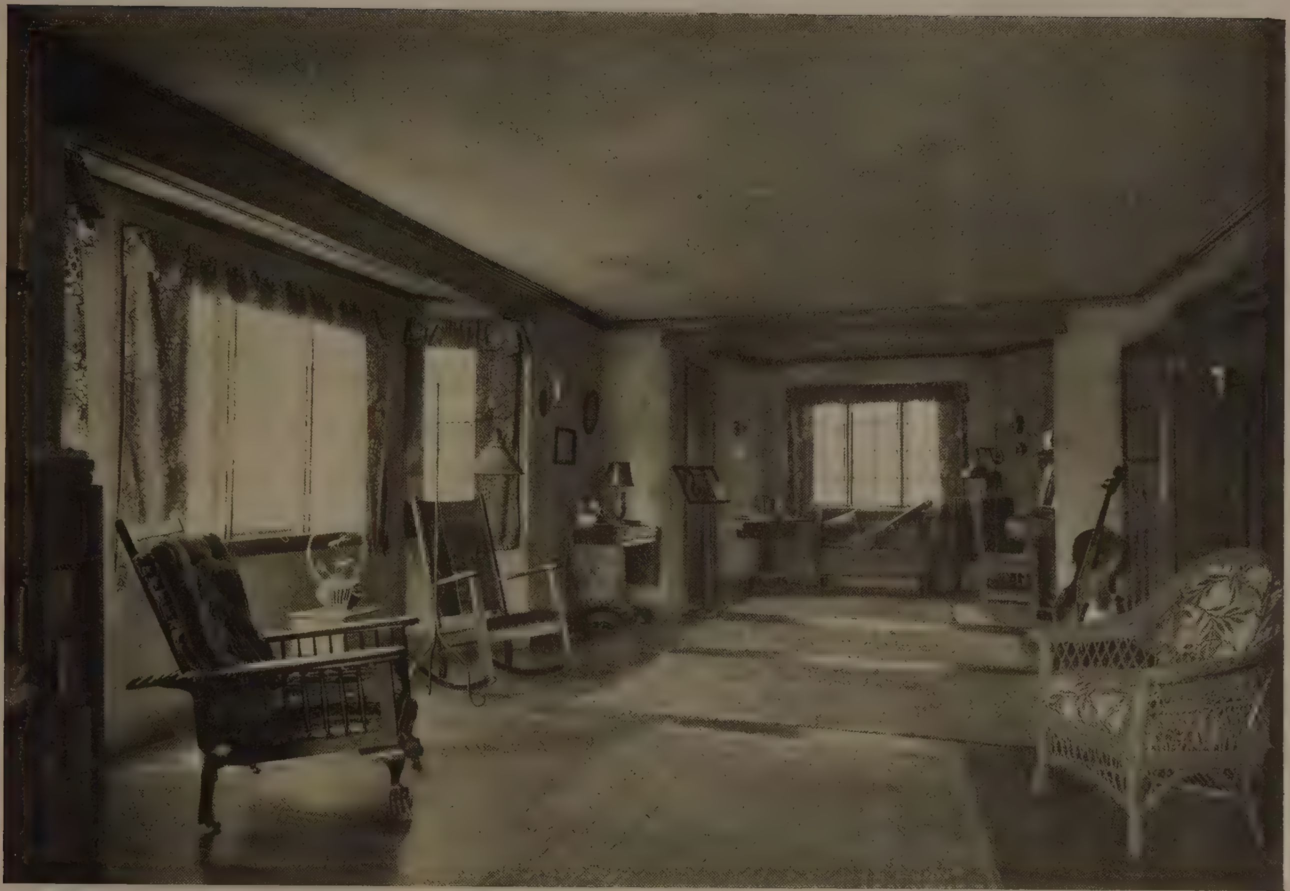


House, Edward T. Sanderson, Wellesley, Mass.

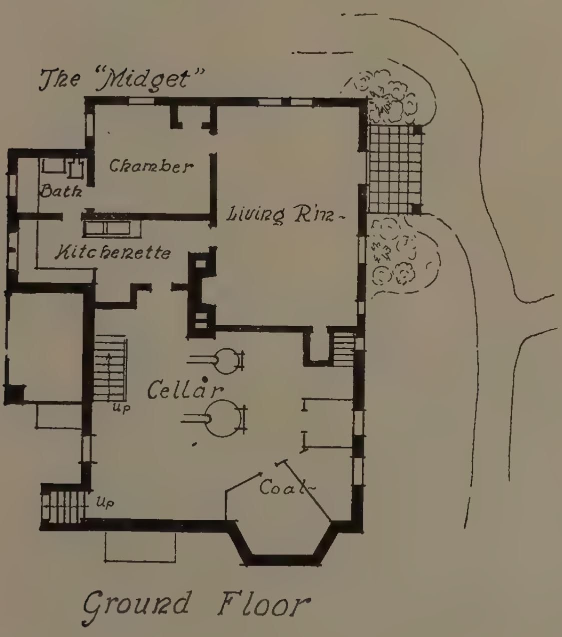


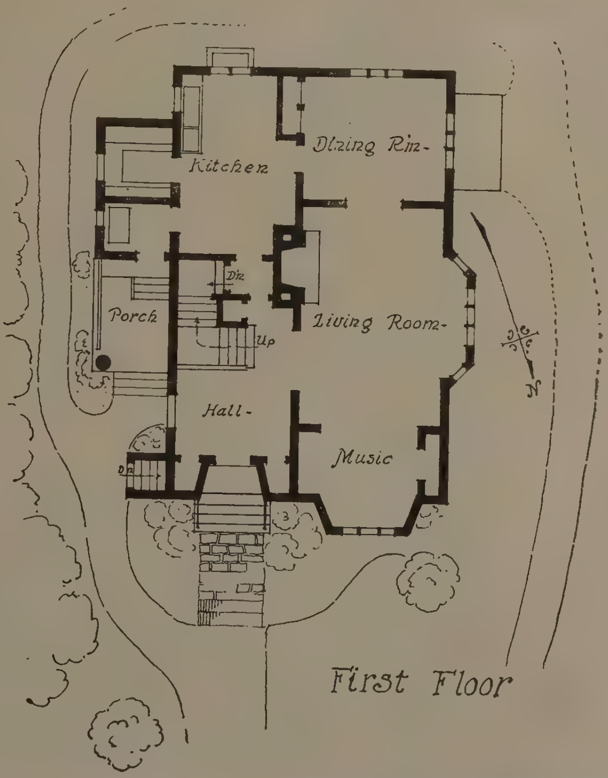
HOUSE, EDWARD T. SANDERSON, WELLESLEY, MASS.

Edward T. Sanderson, Architect.



LIVING-ROOM, MAIN FLOOR.





HOUSE, EDWARD T. SANDERSON, WELLESLEY, MASS.

Edward T. Sanderson, Architect.

The School-Building for the Parish of SS. Peter and Paul, Fall River, Mass.

Cram and Ferguson, Architects

THIS is somewhat of a departure from the conventional schoolhouse design.

The style is modified Spanish. This brings it into harmony with the church standing across the street, which was designed by Cram, Goodhue, and Ferguson more than twenty years ago.

The material of the exterior is gray buff brick with cast concrete stone trimmings. One of the most prominent features of the exterior is the roof over the main entrance pavilion, which is executed in Spanish tile with a wide range of color varying from a sage brown to a dark purple.

The plan consists of a central corridor, flanked on each side by three classrooms. Coat-rooms of ample size adjoin each classroom. Staircases of iron and slate at each end of the building, enclosed in brick walls, provide ideal egress conditions.

The interior is finished in chestnut, stained a pleasing walnut brown. Natural slate blackboards are used throughout.

Fresh air is introduced into the classrooms by means of a separate ventilating unit for each classroom. The unit consists of a large radiator and a Multivane fan operated by an electric motor, the whole enclosed in an enamelled metal housing. The motors are operated by direct current supplied by a motor generator in the basement, and are practically noiseless at all speeds. The advantages claimed for the unit system are greater flexibility, the elimination of the central fan, fan-room, and large ducts in the basement, resulting in a saving in headroom and consequently in the cost of the building. In this particular building the absence of the unsightly ducts is a considerable advantage, as it results in a large, light, basement room, which is used for parish suppers and other parochial activities.

The foul air is removed from the classrooms by means of gravity ducts, discharging through ventilators in the roof in the usual manner.

Tests Point Way to Safe Elevators

SEVENTY-FIVE per cent of fatal accidents are preventable, the United States Bureau finds. About three-fourths of all fatal elevator accidents are found to occur at the hoistway door, either because of the door being opened when the elevator is not there or because of the elevator starting when the door is open. These accidents can be prevented by a reliable interlock, as when such a device is used the elevator must be stopped at the floor before the door can be opened, and the door must be closed before the car can be started again.

During the past year the Bureau of Standards has been conducting tests to determine the reliability of the various types now on the market. The devices have been given endurance tests under normal conditions, they have been tested in a corrosive atmosphere, in a dust-laden atmosphere, without lubrication, and under conditions of misalignment likely to occur in practice.

The tests were conducted at the request of the city of Baltimore, and will permit city governments to base their approval of such devices on actual performance tests instead of on visual inspection alone. The results have also been made available to the manufacturers of the devices tested, and in most cases they have improved their designs in accordance with the suggestions offered.

Show Paraffin Best for Waterproofing Stone

THE superiority of paraffin treatments for waterproofing stone has been demonstrated by a weathering test of colorless waterproofing compounds conducted at the Bureau of Standards, Department of Commerce, during the past three years. Samples of Indiana limestone and of sandstone have been used in the tests, one-half of each specimen being coated with the waterproofing compound, while the other half was left untreated.

Very little deterioration was noticed in the case of the paraffin treatments during the period of the test. Materials using aluminum stearate and mixtures of paraffin and china wood oil were also found to give good waterproofing values when properly applied. Materials consisting of solutions of glue, magnesium fluosilicate, cellulose nitrate, resins, etc., are not sufficiently durable to justify their use, in the opinion of the bureau.

Most of the materials tried discolored the stone to a considerable extent at first, depending on the porosity of the stone. Very dense types were not appreciably discolored, while very porous ones appeared greasy for several months after treatment. After a year or more of weathering the discoloration disappeared and the treated surface appeared lighter and cleaner than the untreated.

A new series of tests is being started with these materials on dense limestones and marbles. A new compound which has recently come into use in England consists of a silicon ester. This material is being included in the tests.

A Correction

IN Mr. Emerson's article on "Stone" in our June number he stated that the crushing strength of Quincy granite only averages around 10,000 pounds to the square inch and that the Vermont marbles average 13,500 and some blue stones 19,000.

The result of recent tests made on three cubes of Quincy granite by Mr. Irving H. Cowdry, of the Institute of Technology, Cambridge, Mass., shows that the crushing strength of Specimen No. 1 was 22,900 pounds; No. 2 was 30,150 pounds; and No. 3 was 28,900 pounds—making the average 27,317 pounds.

We have received an interesting illustrated pamphlet written by Mr. William M. Adrian, giving a brief history of Quincy and some instructive facts about Quincy granite and its uses.

Dominion of Canada War Memorial

GAETANO CECERE, sculptor, and Lucian E. Smith, architect, in collaboration, were successful in winning a place in the final competition for the Dominion of Canada War Memorial to be erected in Connaught Square, Ottawa. From the 127 contestants in the first stage seven were chosen to enter the final competition which is due to render the middle of November. Of the seven selected three were from England, two from Canada and one from Scotland.

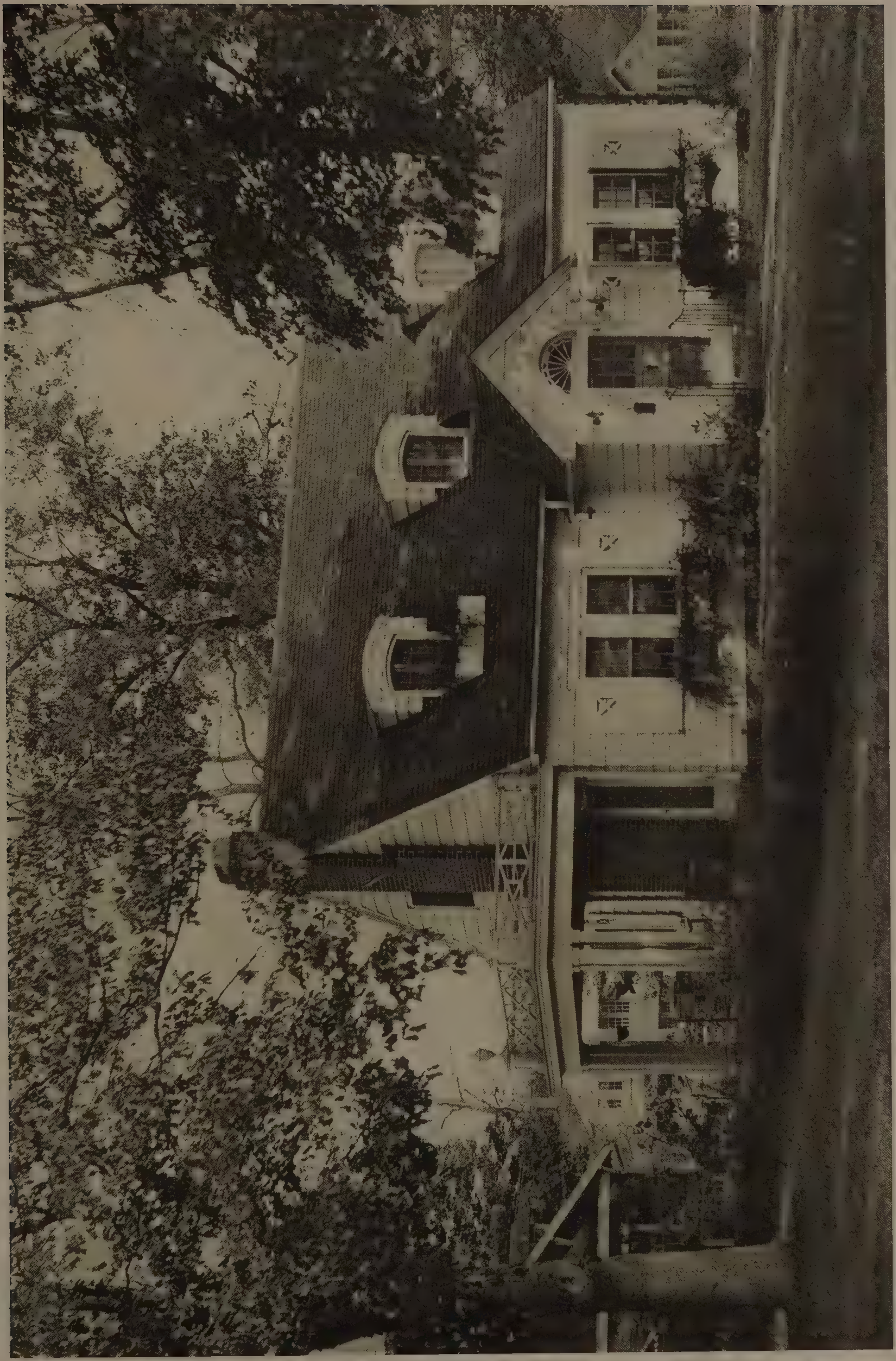
Both Mr. Cecere and Mr. Smith are of the American Academy in Rome.

Book Reviews

ENGLISH ARCHITECTURE AT A GLANCE. A Simple Review in Pictures of the Chief Periods of English Architecture. With historical notes by FREDERICK CHATTERTON. G. P. Putnam's Sons, New York.

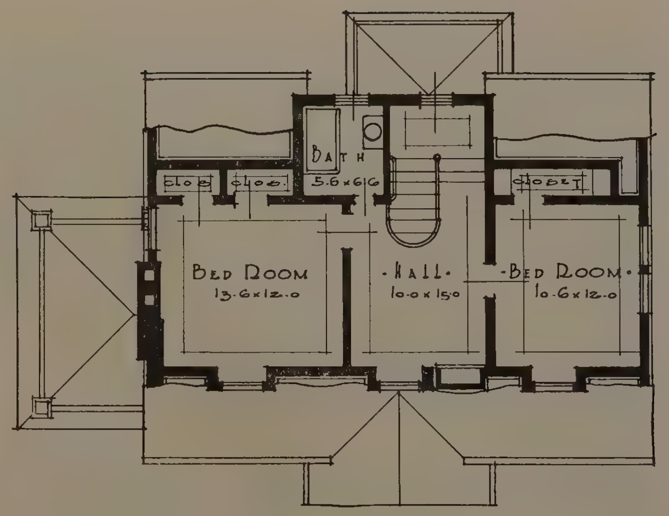
These are books for those who run and read, for the amateur rather than the architect, for those who haven't time "to read much."

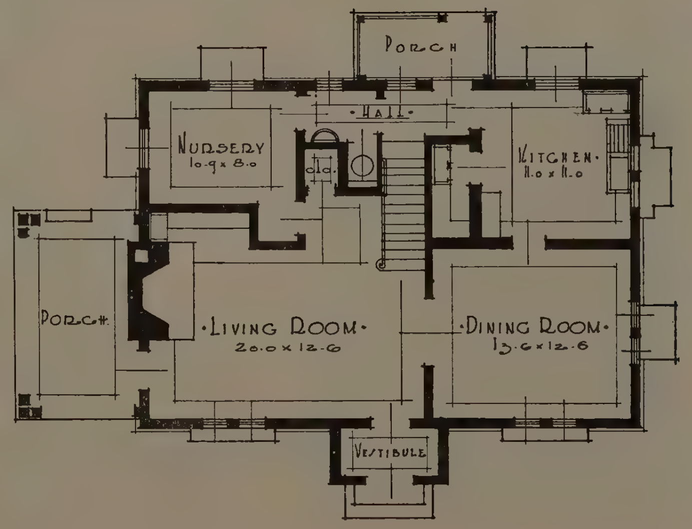
The text is subordinated to the numerous illustrations and those in the book on furniture are generally excellent. The drawings of architectural details would have been of more value if they had been drawn with greater care.



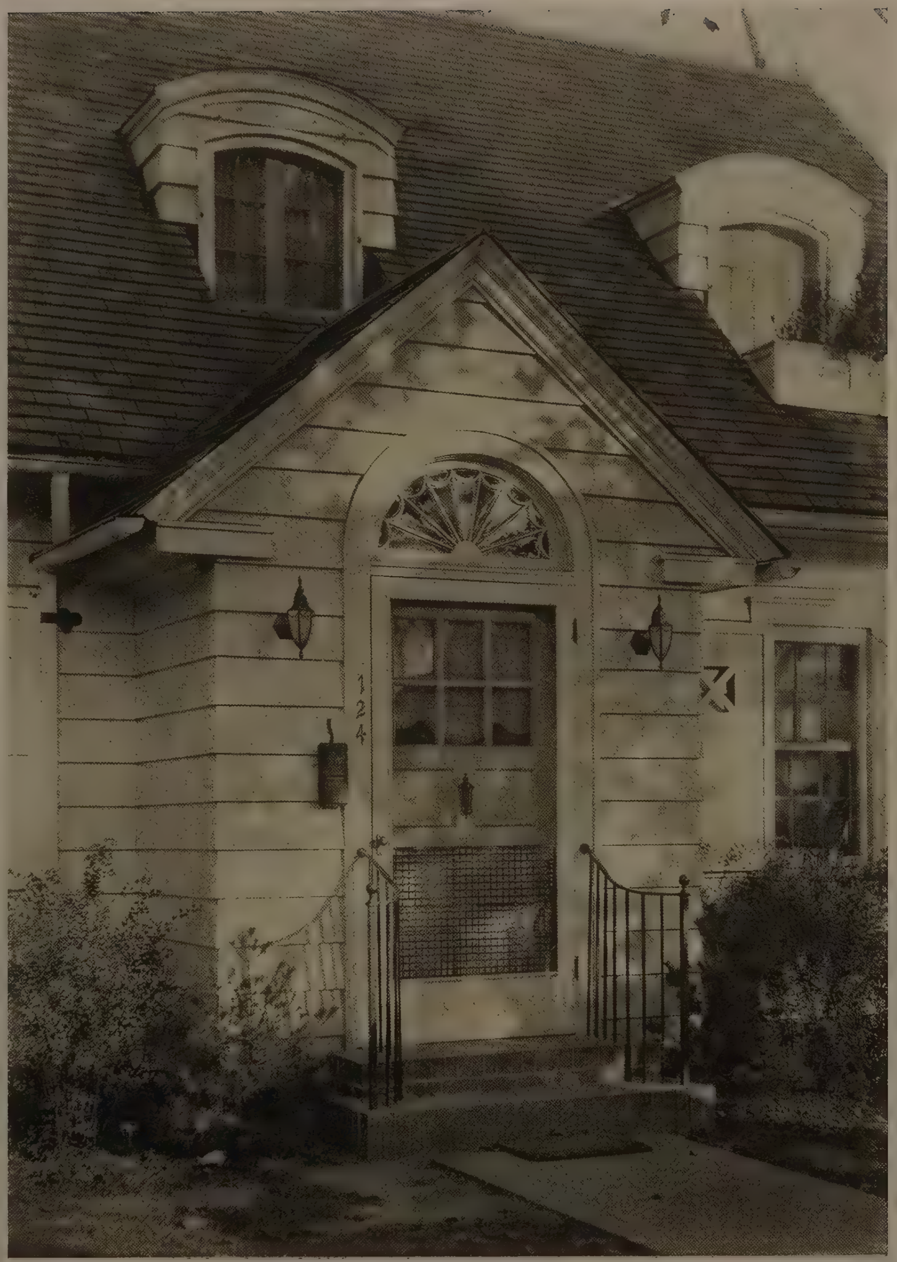
HOUSE, FRANK CRANFORD, TERRE HAUTE, IND.

Johnson, Miller, Miller & Yeager, Architects.

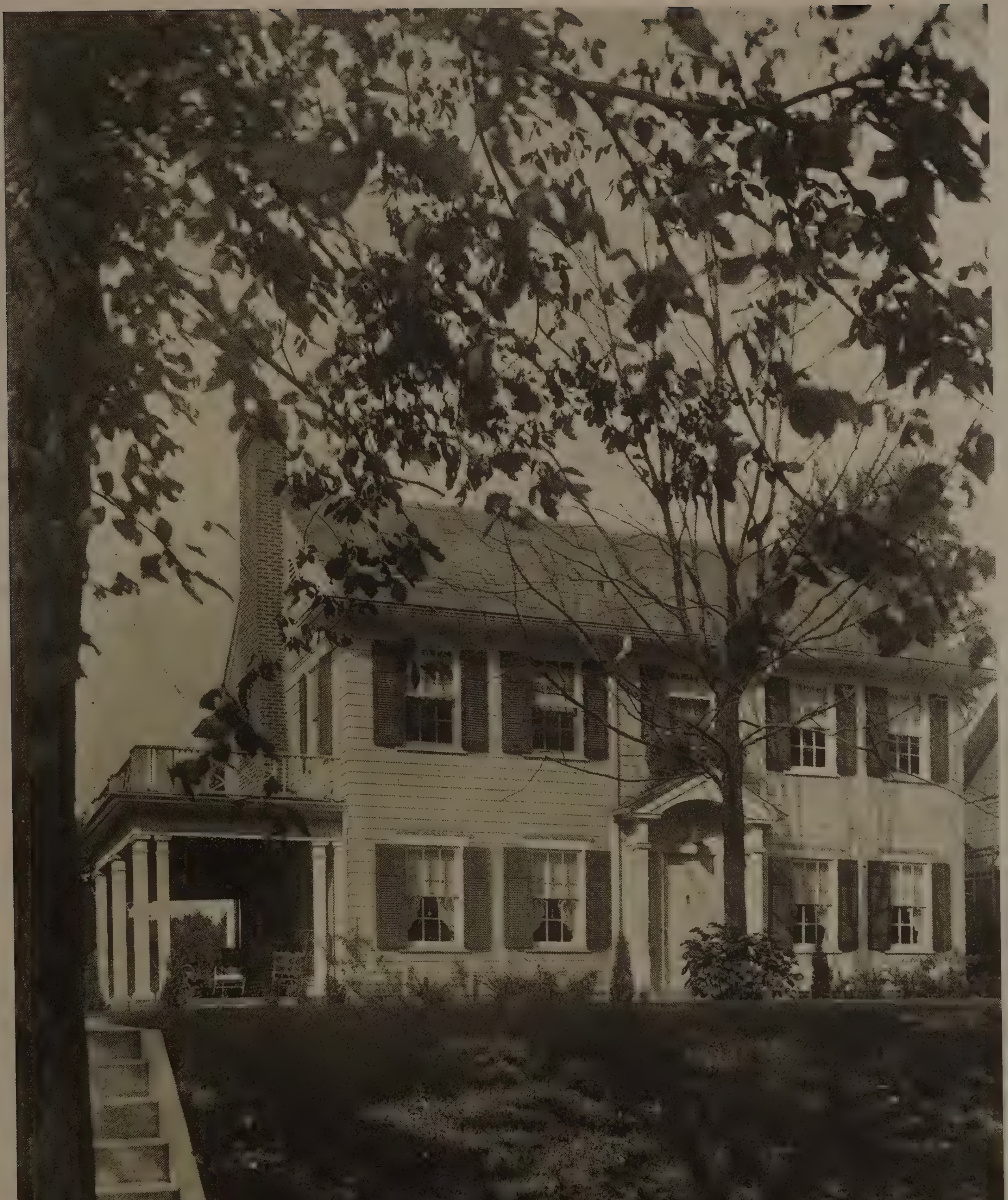




Johnson, Miller, Miller & Yeager, Architects.

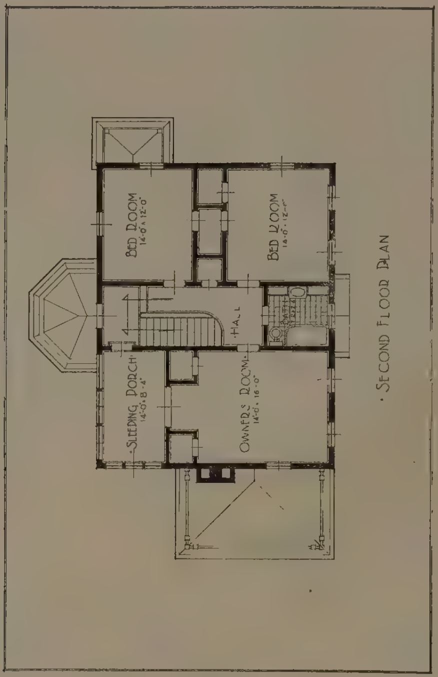


HOUSE, FRANK CRANFORD, TERRE HAUTE, IND.

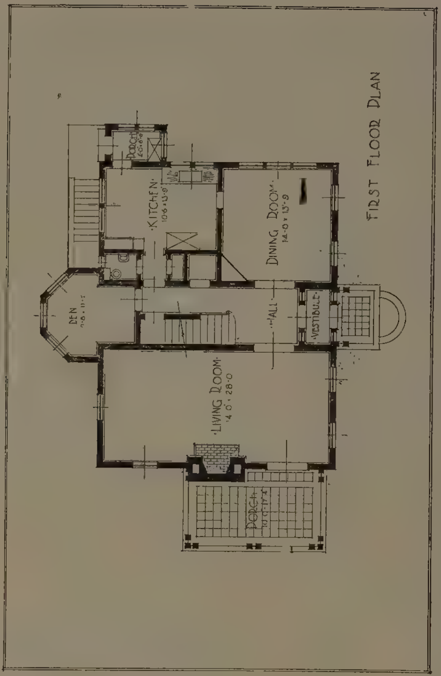


HOUSE, L. A. CARROLL, KNIGHTSTOWN, IND.

McGuire & Shook, Architects.

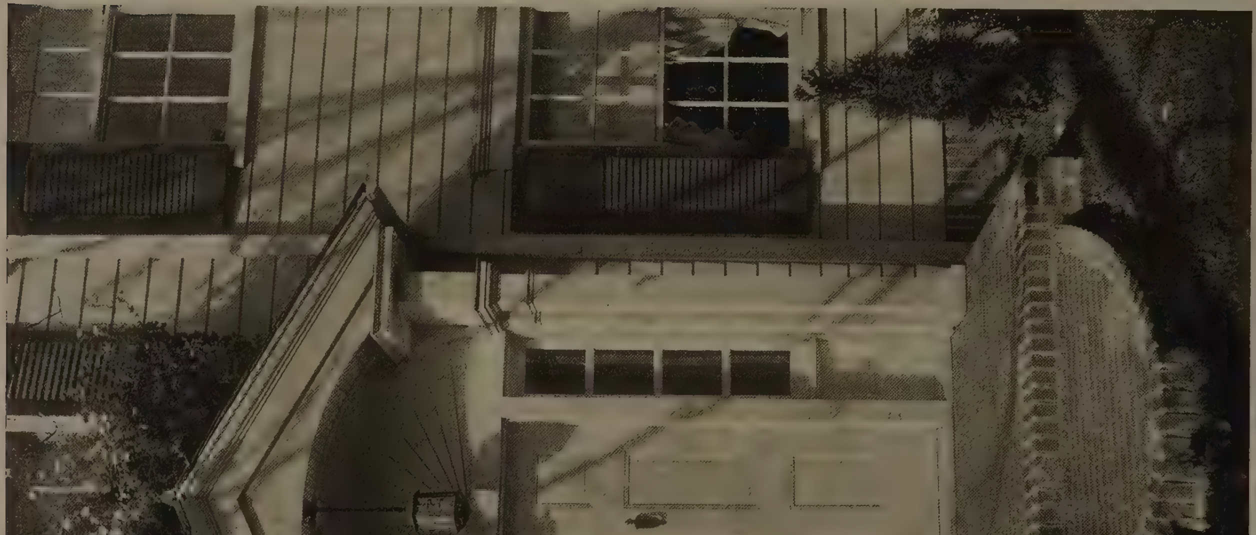


SECOND FLOOR PLAN

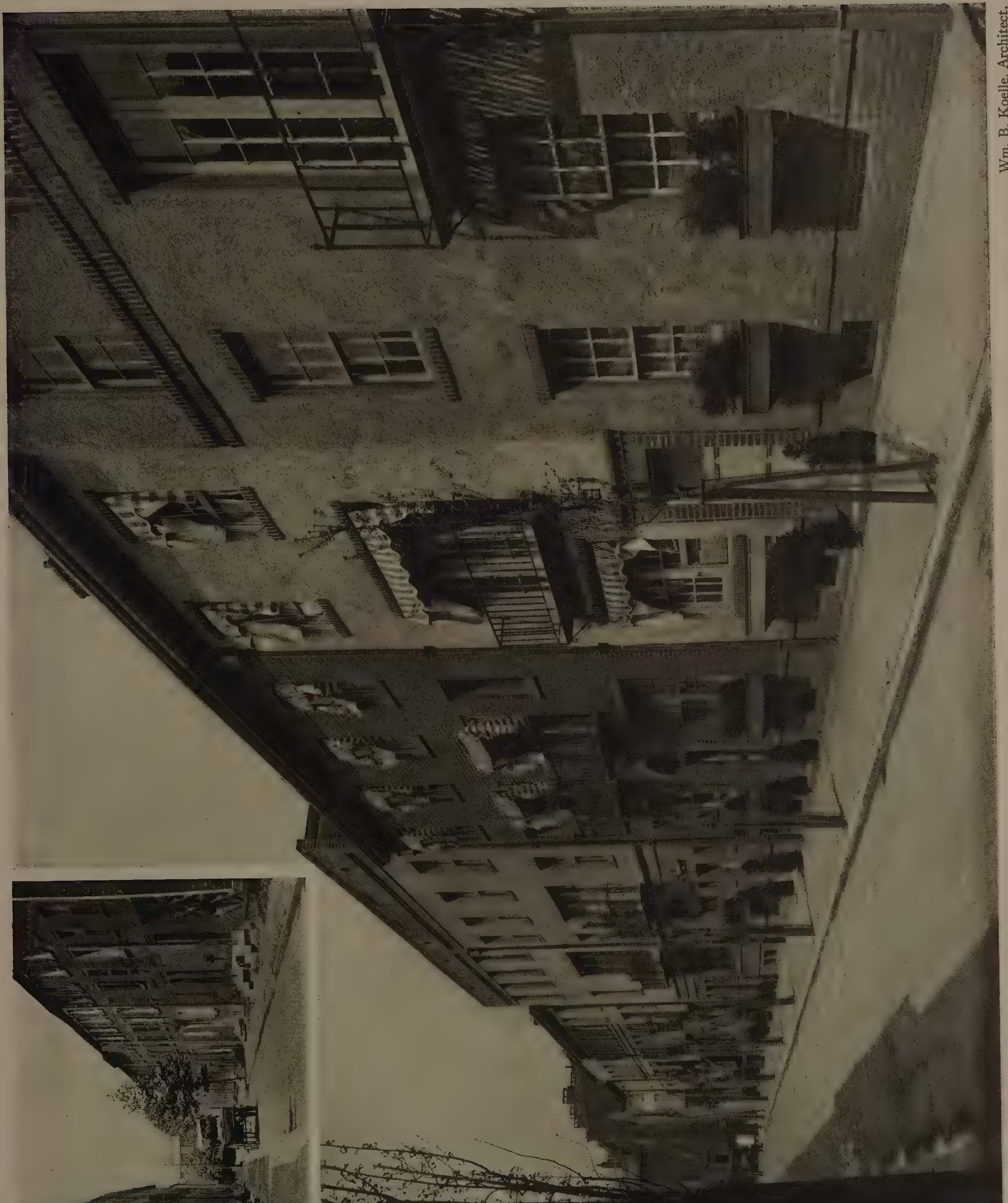


FIRST FLOOR PLAN

McGuire & Shook, Architects.

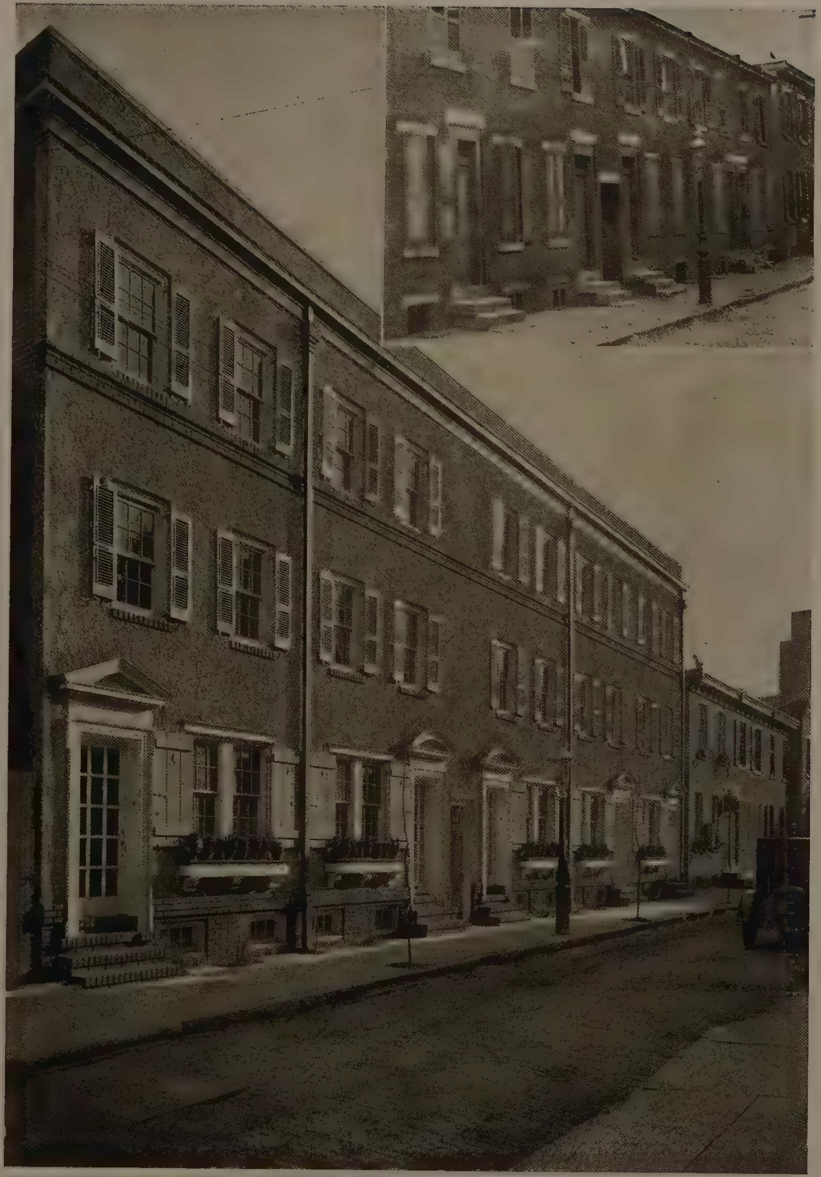


HOUSE, L. A. CARROLL, KNIGHTSTOWN, IND.

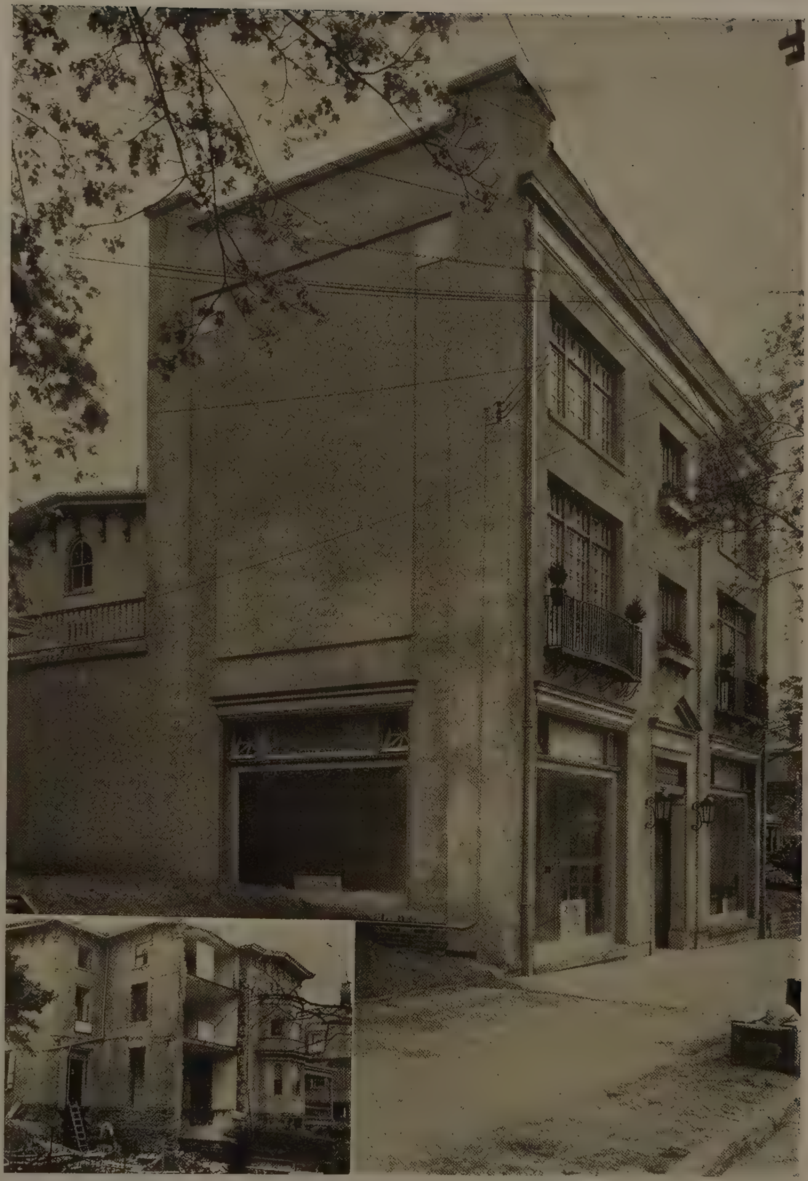


Wm. B. Koelle, Architect.

ALTERATIONS IN PANAMA STREET, PHILADELPHIA.

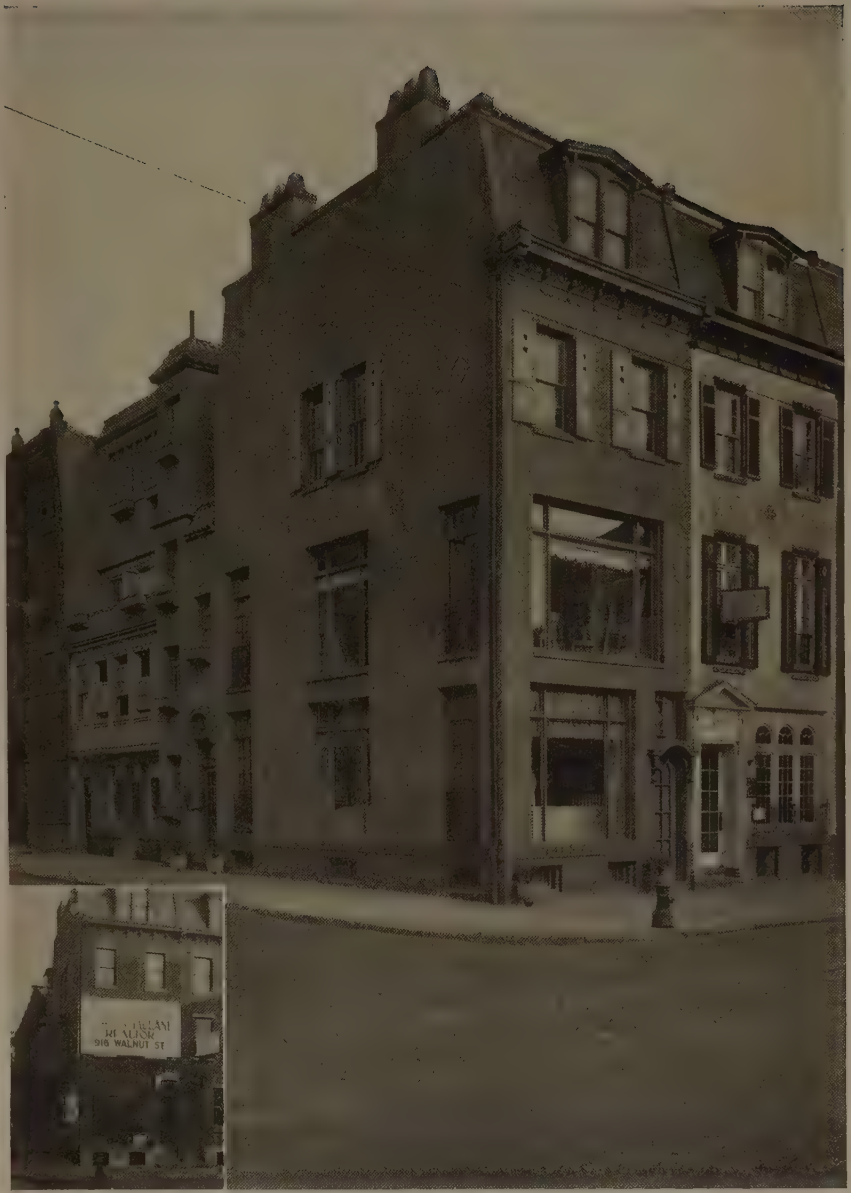


ALTERATIONS IN VAN PELT STREET, PHILADELPHIA

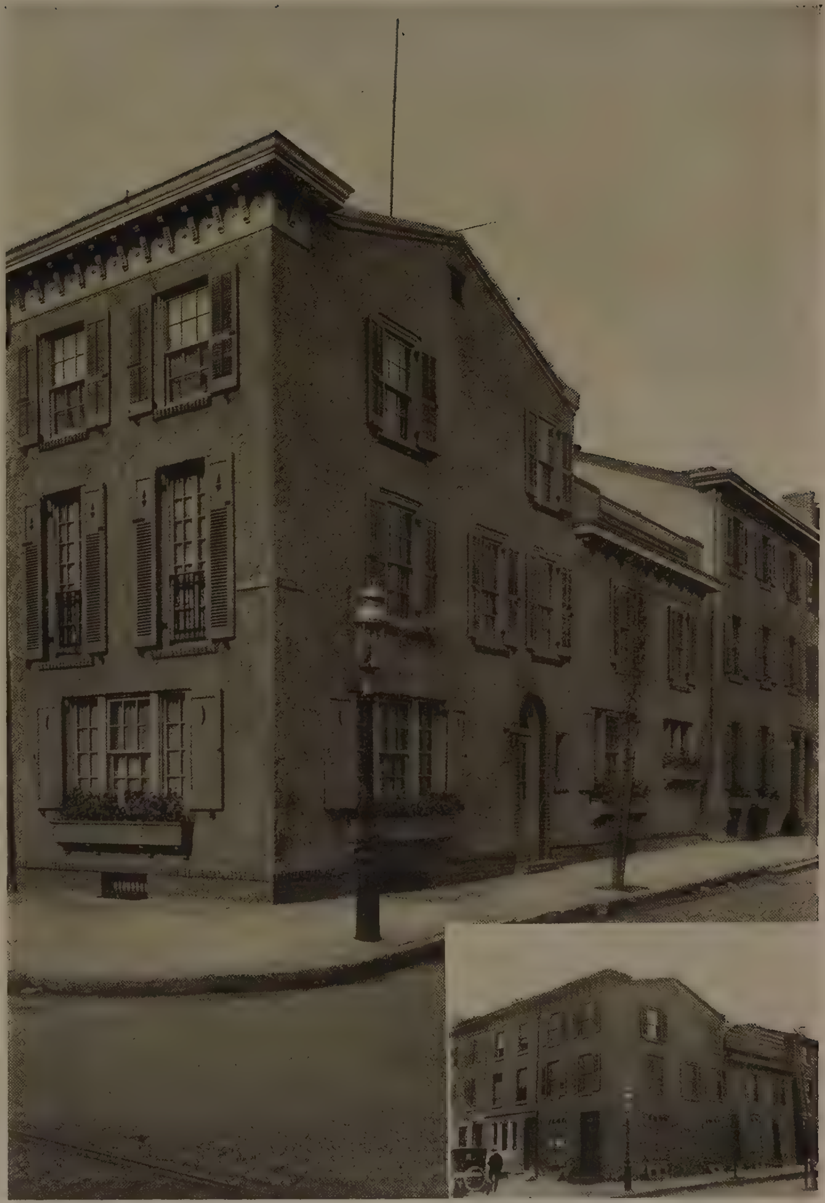


ALTERATIONS, 210 W. CHELTON AVENUE, PHILADELPHIA

Wm. B. Koelle, Architect.

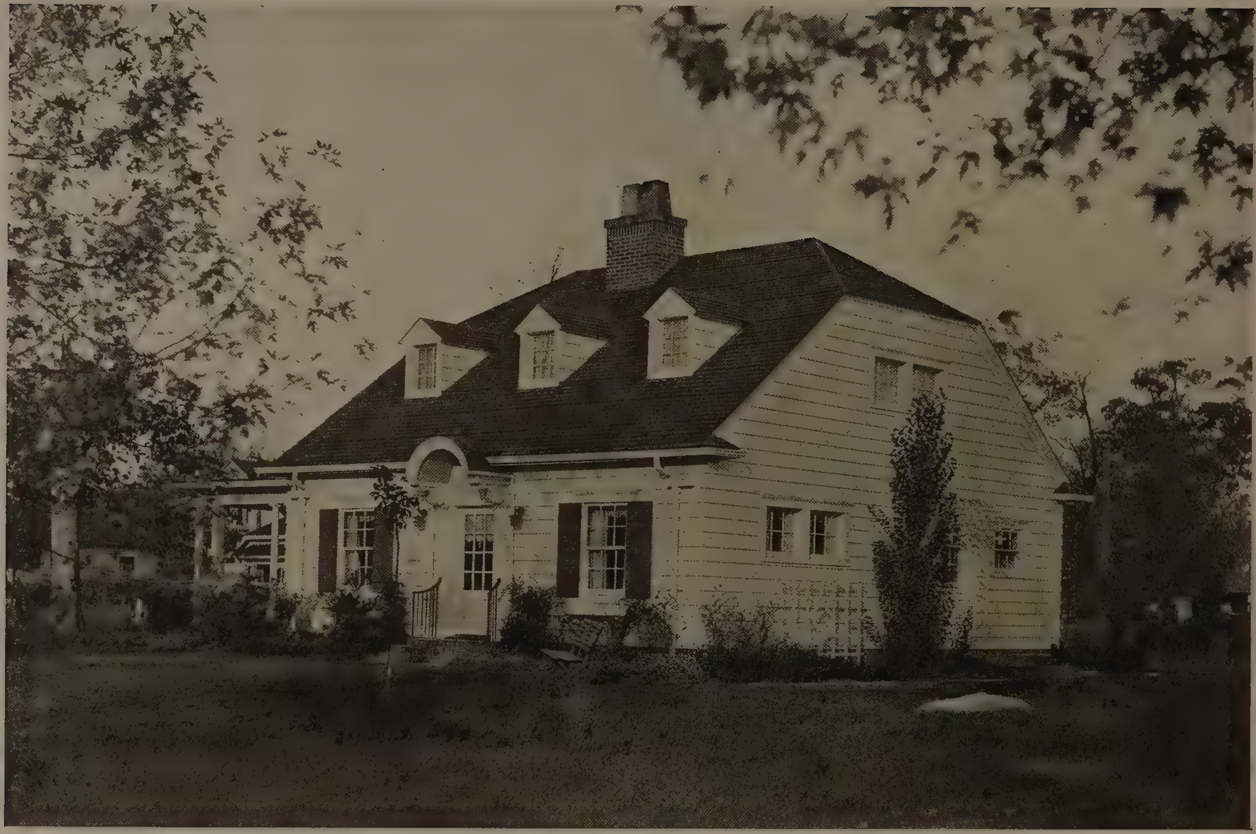


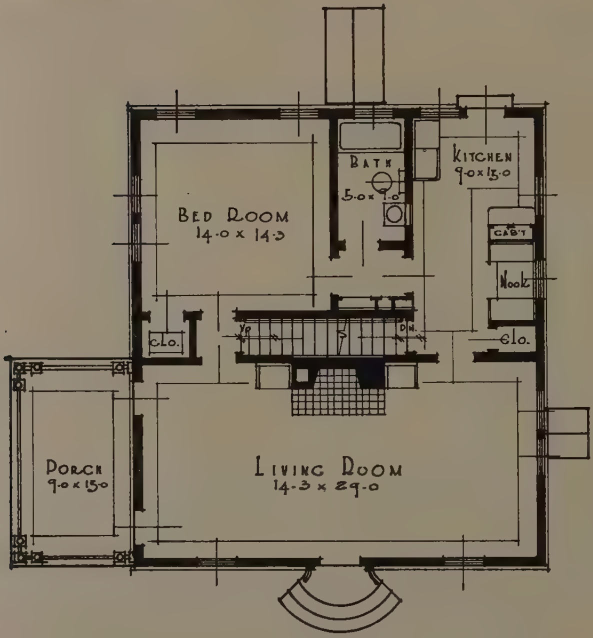
ALTERATIONS, 219 SOUTH 17TH STREET, PHILADELPHIA.

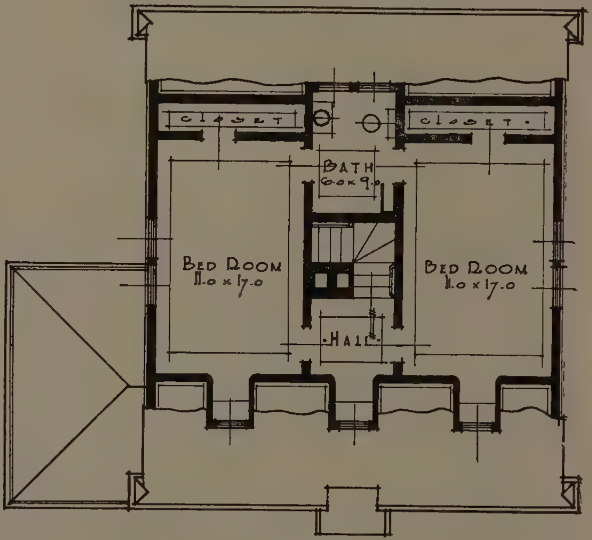


ALTERATIONS, 19TH AND PANAMA STREETS, PHILADELPHIA.

Wm. B. Koelle, Architect.







HOUSE, FREDERICK PAYNE, TERRE HAUTE, IND.

Johnson, Miller, Miller & Yeager, Architects.

The Romance of Building

By Richard P. Wallis

THIRD ARTICLE

IN selecting the material for the façade of a monumental structure such as the library, the architect was impelled by motives of professional responsibility to choose a substance that would readily lend itself to the expression of dignity and design that he sought to realize, yet at the same time be endowed with those characteristics and properties of durability that would perpetuate his handiwork in its original state of preservation.

The character of this exterior masonry must definitely express the respectability of the use to which the building is dedicated. As a part of the impressive Mall scheme due consideration was of necessity given to the design and character of the neighboring structures in order that the unity of this proud group be preserved. Concomitantly with this factor of appearance the architect must not lose sight of the necessity of selecting a material that will successfully contest the insatiable efforts of nature to reduce all substance to dust. These agencies of destruction are frost, moisture, and the sulphur-laden atmosphere of a great manufacturing city.

The selection by the architect of a mezzotint Georgia marble from the celebrated quarries located at Tate, Pickins County, Ga., for this particular structure was particularly fortunate.

The dove-gray tint of this beautiful crystalline stone, flecked with faint streaks of grayish graphite, its many facets glistening in the sunlight like a huge lump of sugar, gives to the structure that character of richness without ostentation that is so commendably suitable.

The dense, compact crystalline structure of this material, over 98 per cent of which is pure calcium carbonate, is admirably adapted to the simple ornamentation that is applied to the building in the form of carving, tooling, and so forth.

This same characteristic affords an exterior free from flaws and surface imperfection that defies the efforts of wind and weather to discolor and destroy. Having an absorption of substantially 90 per cent less than its nearest rival, it is evident that there is but scant likelihood of stains resulting from an infiltration of water containing foreign materials in solution. A block of this marble weighing 100 pounds will absorb but .028 pound of water—certainly not an amount sufficient to entitle it to good standing in the sponge family.

The closely interwoven structure of this marble enables it to develop a crushing strength of 13,100 pounds to the square inch, or 935 tons to the square foot.

The design of the architect called for an amount of 105,000 cubic feet in this structure, including the balustrades and areas at the sidewalk level. Loaded in the manner in which this material was received from the quarry, each piece carefully crated and numbered to agree with the setting plan, a single freight-train over two miles in length would be required to convey the marble from the quarry to

View of the genuine Hauteville C. H. Quarry, showing methods of extraction by wire saw and pneumatic drill, and blocks in preparation for shipment.

Quarries at Nelson, Ga., source of exterior marble for Cleveland Public Library.

the building site. When it is considered that each and every block entering into the construction of the library was quarried, dimensioned, and finished by mechanics in a plant six hundred miles distant, whose sole source of information as to the requirements of this particular operation consisted of drawings made practically before building operations were commenced, and that this masonry co-ordinated exactly with the products of window manufacturers, bronze and iron foundries, and various other trades, all located in widely scattered sections of the country, it is indeed to be wondered at that such perfect harmony of effort, as is actually in effect, was attainable.

This delivery of completely fabricated parts to the building site for inclusion therein is but typical of practically all of the crafts involved in the intricate business of modern building construction. The excellent results here obtained afford an admirable commentary on the precision of manufacture attained by these plants.

The story of the origin and the manufacturing methods employed in the production of this marble is intimately woven, not only into the history of man from its earliest beginnings but into that much vaster measure of time, the geologic epochs. Much of the history of the genesis of the earth is written in unmistakable terms in these rock formations, needing only the shrewd interpretation of the geologist to depict the almost infinite durations of time and the cataclysmic forces that have left the earth as we find it to-day.

The rich deposits from which this marble was taken are located in northern Georgia and cover a known area of approximately four miles in length by three-eighths of a mile in width. A depth of 185 feet has been reached with no apparent indication of the deposits running out, and an ultimate depth of over half a mile is well within the realms of possibility.

Assuming an average depth of only 200 feet, a reasonably safe assumption, a truly stupendous mass of marble, amounting to some 8,363,520,000 cubic feet in volume, is available for the many purposes to which this material is put. At the current market price this deposit represents in value the sum of $12,545,280,000, which is a sum greater than the entire interest bearing debt of the United States in the year 1918.

Geology tells us that thousands of years were consumed in the creation of this deposit. At one time, some years ago to be sure, the stratification immediately underlying this deposit, at whatever depth it may be, represented the sea bottom. Upon this ocean bed there rained in patient succession the débris from countless millions of organisms that lived and died in that prehistoric sea. In time the calcareous deposits of shells, skeletons, etc., became consolidated under its own pressure and became a limestone. In turn this limestone became subjected to certain crustal stresses set up by the gradual contraction of the earth's surface. These titanic forces, generating much heat in their activity, wrought a metamorphosis of this limestone into a fully crystalline material, which we to-day know as marble.

This same age-long process has been reproduced in miniature in the laboratory and synthetic marble created by subjecting to great heat limstone and chalk contained in a closed gun-barrel.

The formation of organic calcareous sediments is going on to-day in the ocean on a large scale about coral reefs and shell-beds and wherever the minute calcareous shells of various marine organisms are deposited upon the ocean floor and wherever lime-secreting algæ abound.

It is from a consideration of facts as patent as these that we are forced to abandon any preconceived thoughts we may harbor as to the permanency of the earth or any part thereof upon which we dwell as we ourselves are acquainted with it.

Where the fine Italian marble is quarried in the Apennines Mountains, near Carrara, Italy.

The mighty forces of nature are forever bent upon an endless redistribution of the earth's ingredients. We, as observers, are limited in our observation by the infinitesimal span of years allotted to us, and we fail to realize that there is no finale to nature. Seas existed where arid deserts now bake in the pitiless sunshine, yet who can safely prophesy but that in some far distant epoch old King Neptune may there again reign supreme?

The quarrying of these marbles by the age-long processes of chemistry and physics is to-day fundamentally the same as the practice of the ancient Greeks. The principal innovations made in late years have been in the introduction of modern motive power in the carrying on of the operation of removing these blocks from the ledge and their subsequent treatment. Pliny describes much the same system of sawing marble as that employed to-day. Mills similar to those in present use, driven by water-power, were established in Germany during the fourth century, and Leonardo da Vinci, that versatile genius of the Middle Ages, was fully conversant with the various principles involved.

To-day electricity, compressed air, and steam have supplanted manual labor and even water-power in the various processes incident to the manufacture of marble for commercial purposes.

The unprecedented demand for marble and the refinement introduced in the last few years in quarrying this most beautiful of building stones have practically eliminated waste, and have necessitated the exploitation of known deposits to much greater depths than were ever thought economically possible by our forefathers.

The presence of valuable deposits of marble is made known by occasional outcropping of the topmost stratum. Often vast areas of seemingly commonplace country (no country is in reality commonplace) are underlaid by unsuspected wealth in the form of marble waiting merely the prying eye of the geologist.

The particular quarries from which were taken the Georgia marbles used in the construction of the library were first worked about the year 1840 by the original Samuel Tate, the grandfather of the present owner, Colonel Samuel Tate.

Gazing down into one of these serrated cavities one is impressed with the almost geometrical patterns that meet the eye, wrought by successive quarrying operations.

Blocks of Georgia marble waiting for the finishing touches.

The perpendicular cliffs of glistening sugar-like material, weather stained and soot bedecked, contrast most strikingly with the verdant foliage and the typical red Georgia soil of the surrounding landscape.

As we descend the rickety wooden ladder leading to the field of operations we are more and more impressed by the patient, untiring efforts necessary to rive these blocks from the perpendicular face of the quarry.

Unlike the quarrying of raw limestone for use in Portland cement, blasting operations are not permissible, owing to the shattering effects of the explosives upon the blocks of marble. The tough blocks must be taken individually and with great care from their natural bed.

A steam-channelling machine, travelling backward and forward over a steel rail track, cuts a narrow channel through the solid marble bed outlining the dimensions of the particular block to be removed. Next a series of horizontal holes is drilled at the proper level, and wedges are driven home, separating the the rough block from its natural bed. Additional blocks are cut on the same level, working toward the walls of the quarry. As each level is exhausted, fresh cuts are made in the new floor, and the process continued. Great derricks hoist these rough-hewn blocks to waiting flat-cars for transportation to the the storage yards and finishing mill.

In the finishing mill these rough blocks are sawed into slabs of dimensions dictated by the purpose for which they are intended. The gang-saws, set in frames, a dozen or more blades to a frame, swing slowly backward and forward across the block. Abrasive material is fed into the slowly deepening grooves, together with a jet of water to give the proper bite to the saw-blades.

The slabs, now formed to the proper rough dimensions, are ready for the finishing touches. It is the turn of the stone cutters and carvers to apply their skill to the carrying out of the architect's instructions. Certain blocks receive a rusticated finish, others are tooled smooth, some wrought into fluted drums for the imposing colonnade; balusters are turned, and hand-rails carved.

Once loaded upon the flat-car for delivery to the railroad, the preliminary work is done, and it remains only for the contractor to assemble these blocks to form the ornate shell of the building.

All July Building Records Were Broken

CONSTRUCTION contracts reached the highest July total on record, according to F. W. Dodge Corporation. Contracts in the thirty-six Eastern States (which include about seven-eighths of the total construction volume of the country) amounted to $529,000,100. In only two previous months has this total ever been exceeded, April and June of this year. The decrease from June was only 2 per cent, while the increase over July of last year was over 53 per cent. There is usually a fairly considerable seasonal decline in July.

Last month's record included: $224,712,500, or 42 per cent of all construction, for residential buildings; $72,743,400, or 14 per cent, for public works and utilities; $67,165,900, or 13 per cent, for commercial buildings; $58,148,000, or 11 per cent, for industrial plants (including a $30,000,000 power development in Ohio); and $57,572,000, or 11 per cent, for educational buildings (including large building projects for Harvard, Yale, and Pittsburgh Universities).

Last month's figures brought the year's total of construction started to date up to $3,189,173,800, an increase of nearly 20 per cent over the first seven months of 1924. At the end of June, this year was only 15 per cent ahead of last year.

Contemplated new work reported in July amounted to $702,431,300. This was an increase of 5 per cent over the amount reported in June and 63 per cent over the amount reported in July of last year.

West Point to Have a New Hotel

DRILLING and blasting are under way at West Point for the foundations of the Thayer Hotel, which will replace the historic old West Point Hotel. Rock from the foundations will be utilized in the structure, which has been designed by Caughey & Evans, architects, 29 West 34th Street, New York City. The architecture will be early Tudor, with battlements and turrets in keeping with the post architecture.

For the Structural Steel Industry

ADOPTION of the Code of Standard Practice, reports of signal progress on the Standard Specification promulgated by the organization, adoption of improved cost-finding policies, and plans for the publication of an authoritative handbook for the structural steel industry were among the significant features of the convention of the American Institute of Steel Construction, at French Lick, Ind., last November.

The Code of Standard Practice, the second signal step taken by the Institute toward the goal of standardized, uniform practice throughout the industry, has been pronounced by engineers and steel men as the most complete code of its kind that has been developed for any industry. In unmistakable terms it defines the rights of buyer and seller, and at the same time carefully safeguards the interests of both. It was prepared for the specific purpose of eliminating many of the sources of misunderstanding that have grown up in the industry, and members of the Institute feel that it will meet with the same generally favorable reception which has been accorded the Standard Specification.

The Institute was told at the convention that the Standard Specification has now been written into the building codes of twenty-five cities, and that its influence is being felt very strongly throughout the country. Not only are the economies which it makes possible commending it to architects, contractors, builders and the public generally, but its central theme of standardization is gaining for it an enormous following.

Announcements

Charles N. Whinston & Brother, architects, 2 Columbus Circle, New York City, have opened an office in the First National Bank Building, Mount Vernon, and this office will handle all Westchester County work in the future.

Albert B. Groves, architect, announces his removal from the Stock Exchange Building to Suite 2021 Railway Exchange Building, 6th and Locust Streets, St. Louis.

Daniel Wentworth Wright has been granted a certificate to practise architecture in the State of New Jersey, and wishes to announce that he is now associated with Kenneth Whitney Dalzell, A. I. A., in the general practice of architecture at Maplewood, N. J.

William Sevic, architect, announces the removal of his offices to 1829 Blue Island Avenue, Chicago, Ill.

The partnership of Martin & Ward, architects, was terminated July 31, 1925. Haskell H. Martin and William R. Ward, Jr., will continue their practice of architecture individually at their present offices in the Vickers-Cauble Building, Greenville, S. C.

Experience vs. Science

ENGINEERS are human and so are not exempt from the laws of psychology. President Coolidge in his inaugural address told us that "human nature is about the most constant thing in the universe."

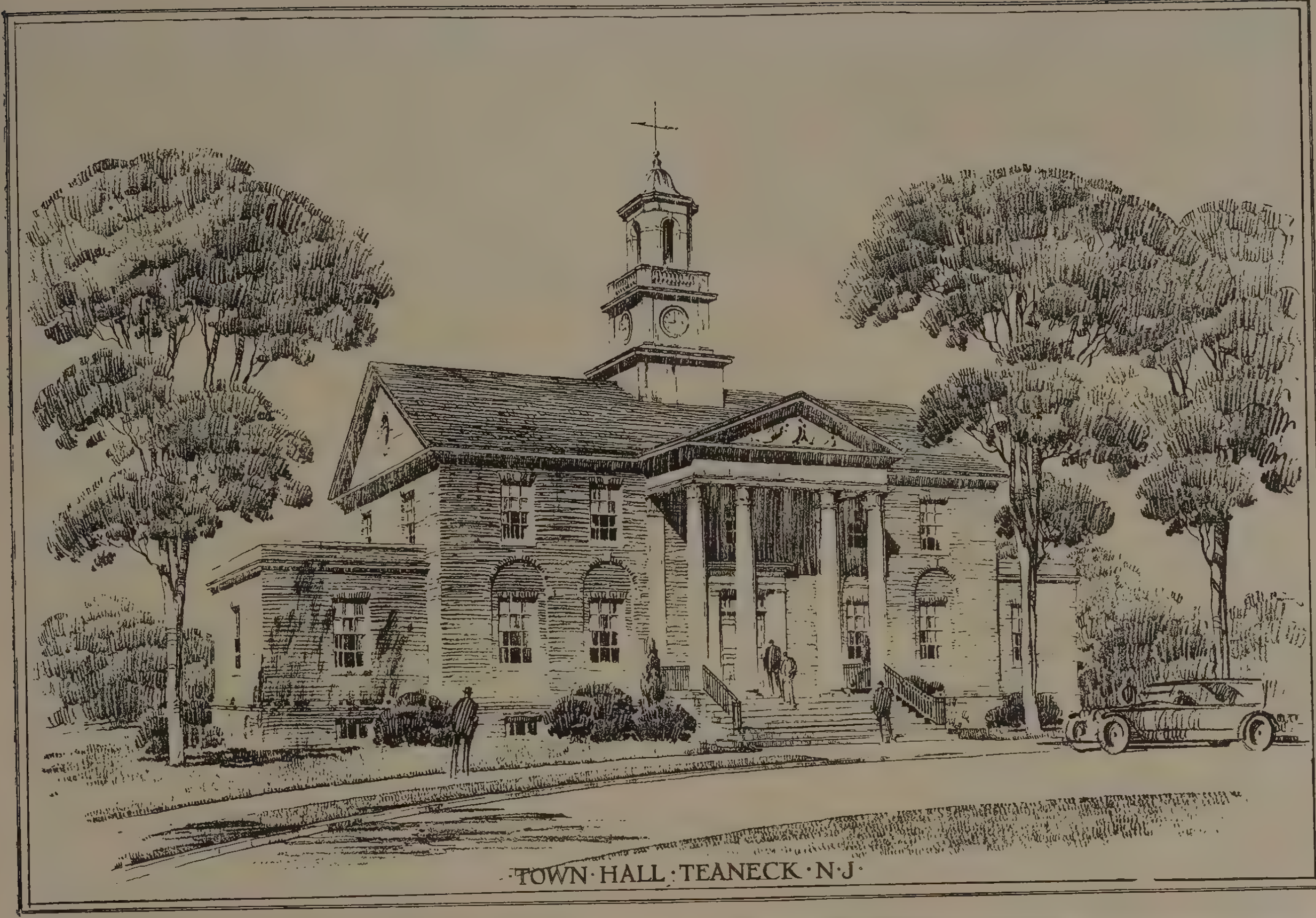
In construction, new materials are adopted slowly. This was necessary when only a long period of experience could prove the value of these materials. Even now, with the scientific methods of laboratory tests, which shorten the period of probation, engineers wait on general experience and consult general impressions rather than the data of science.

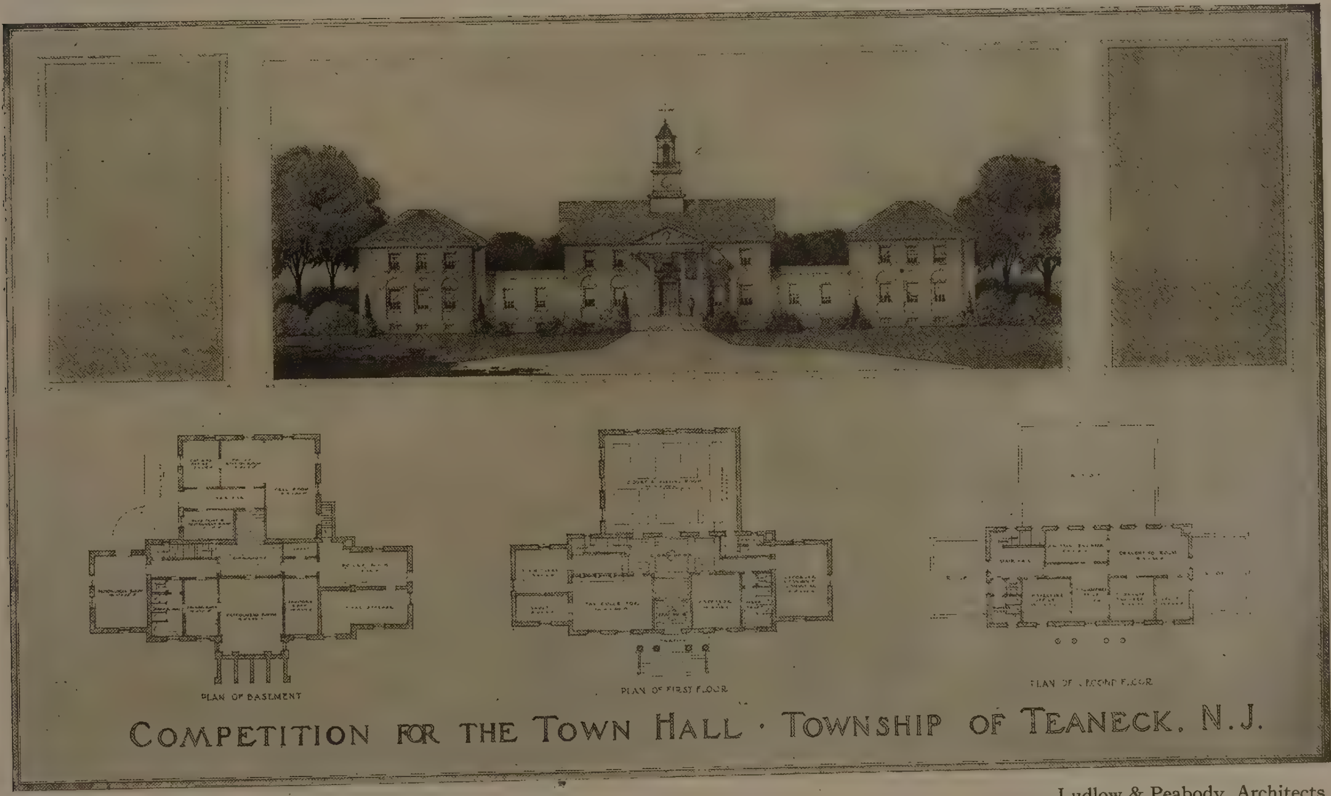
Thirty years ago concrete gradually replaced brick in sidewalks. American Portland cement replaced German cements.

Forty years ago wrought-iron bridges were being built by engineers mistrustful of steel. Engineers were fearful of this strong and supposedly brittle material which was replacing the flexible wrought-iron beams.

Who does not remember that twenty years ago engineers accustomed to design structural-steel frames for buildings and bridges, with their positive metallic-rivetted connections, shook their heads in grave doubt about the permanency of reinforced-concrete frames with their loose bars held together only by a cementing medium? Now, buildings sixteen-stories high, and railroad bridges of forty-foot span are considered safe and conservative. In Europe, where materials are more expensive than in the United States, bolder designs with higher stresses are used.

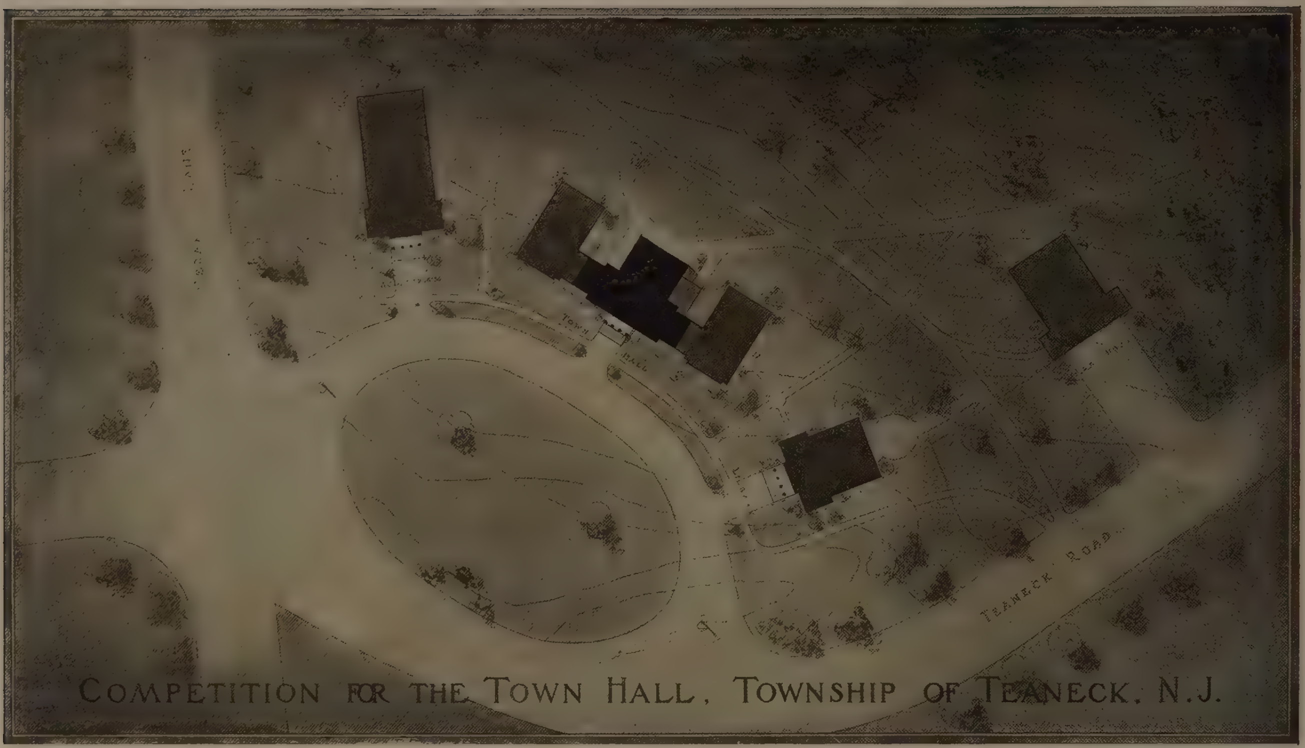
Thus steel and reinforced concrete have won their way and are now the ordinary resource of the designer. No hazard is inherent in their use. Indeed, active movements are under way to increase the allowable stresses on these materials.



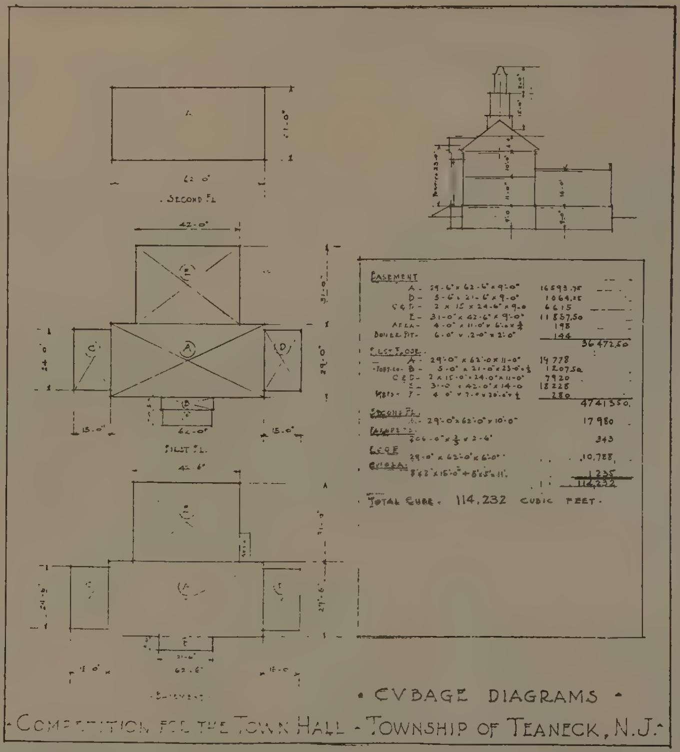


Ludlow & Peabody, Architects.

WINNING DESIGN.


COMPETITION FOR THE TOWN HALL, TOWNSHIP OF TEANECK, N.J.
TEANECK ROAD
TOWN HALL
CEDAR LANE

New Town Hall, Teaneck Township, N. J.


SECOND FL.
FIRST FL.
BASEMENT
BASEMENT
FIRST FLOOR
SECOND FL.
PARAPETS
ROOF
CUPOLA
TOTAL CUBE · 114,232 CUBIC FEET ·
· CVBAGE DIAGRAMS ·
· COMPETITION FOR THE TOWN HALL · TOWNSHIP OF TEANECK, N.J. ·

Ludlow & Peabody, Architects.

A COMPETITION for the selection of an architect for a new Town Hall has been decided in favor of Ludlow & Peabody. Designs were submitted in a competition limited to four firms of architects.

The programme carried the following conditions:

Site.—The site of the new Town Hall will be at the corner of Teaneck Road and Cedar Lane, Teaneck Township, N. J. A copy of the layout of the property has already been given to the competitors.

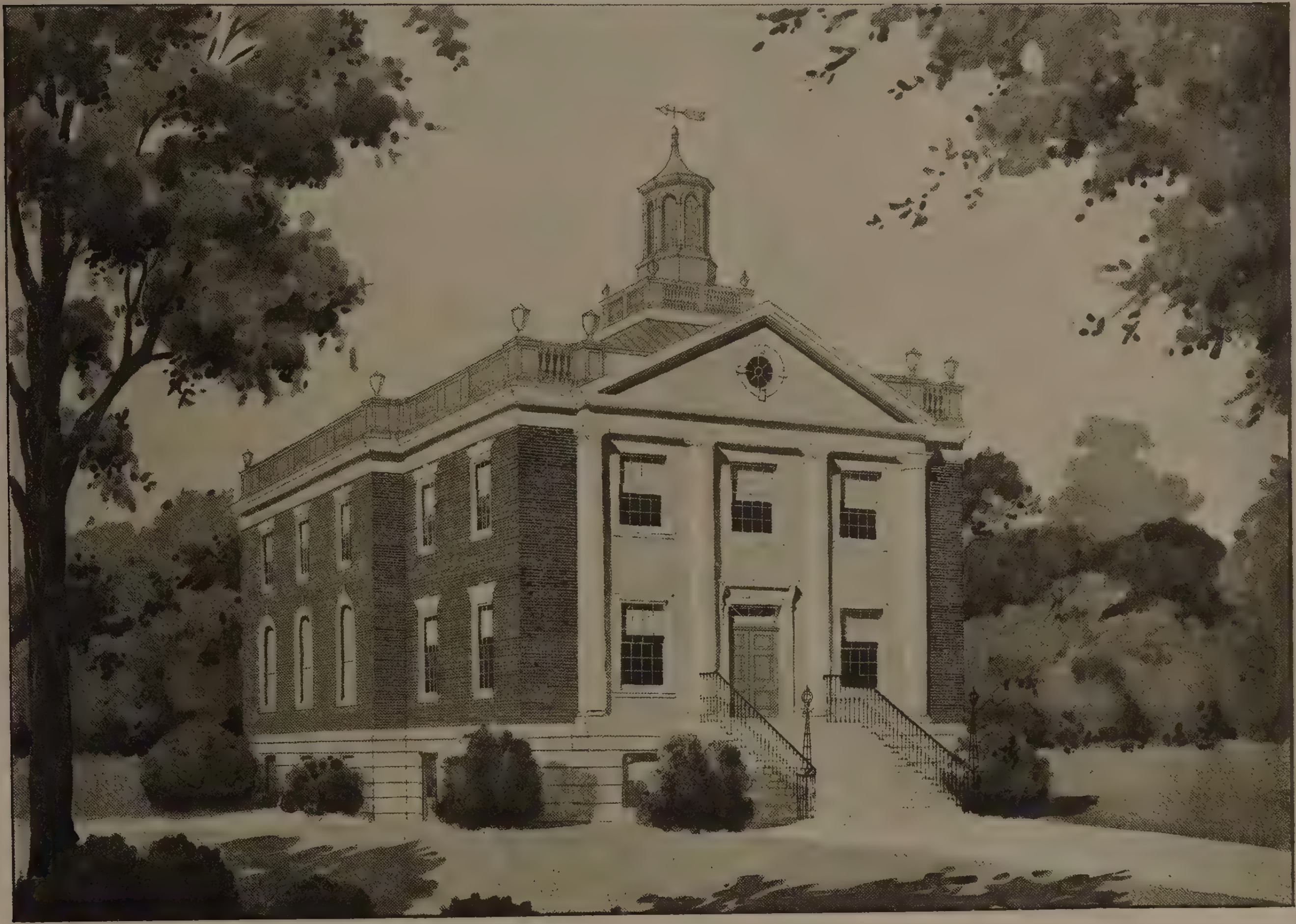
Cost.—For the purpose of this competition the cost of this building shall be figured at seventy cents a cubic foot, and the total figure on this basis shall not exceed $80,000. The materials to be used are subject to the individual choice of the several competitors, the only stipulation being that the building shall be of fire-proof construction throughout.

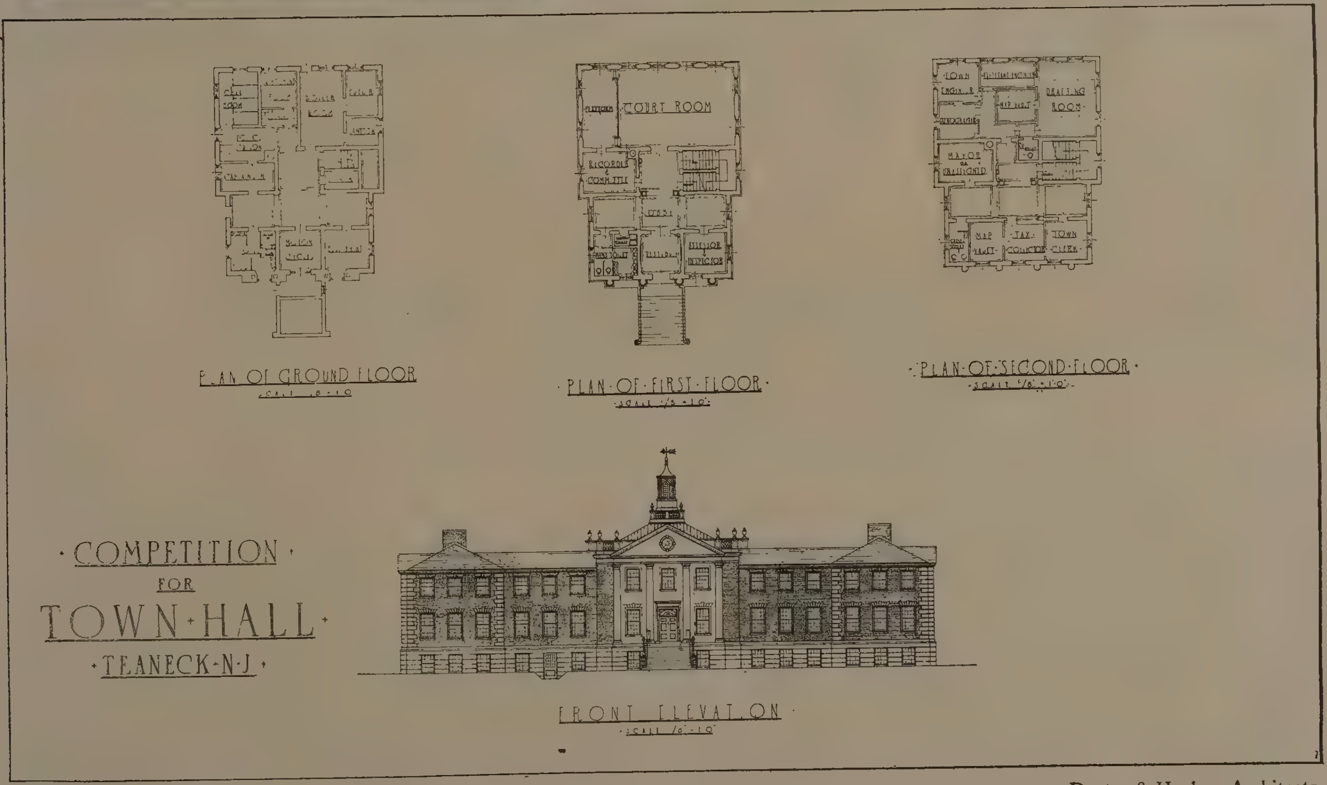
Cubage (*Mandatory*).—Cubage shall be so computed as to show as exactly as possible the actual volume of the building, calculated from the finished level, or levels, of the lowest floor to the highest points of the roofs, and contained within the outside surfaces of the walls. Pilasters, cornices, balconies, and other similar projections shall not be included. Porticos with engaged columns and similar projections shall be taken as solids and figured to the outer face of the columns. When columns are free-standing one half of the volume of the porticos shall be taken. There shall also be included in the cubage the actual volume of all parapets, towers, lanterns, dormers, vaults, and other features adding to the bulk of the building, also the actual volume of exterior steps above grade. Light wells of an area of less than 400 square feet shall not be deducted.

In calculating cubage, account shall be taken of variations in the exterior wall surface, as, for example, the projection of a basement story beyond the general line of the building.

A figured diagram showing method adopted in cubing shall accompany each set of drawings.

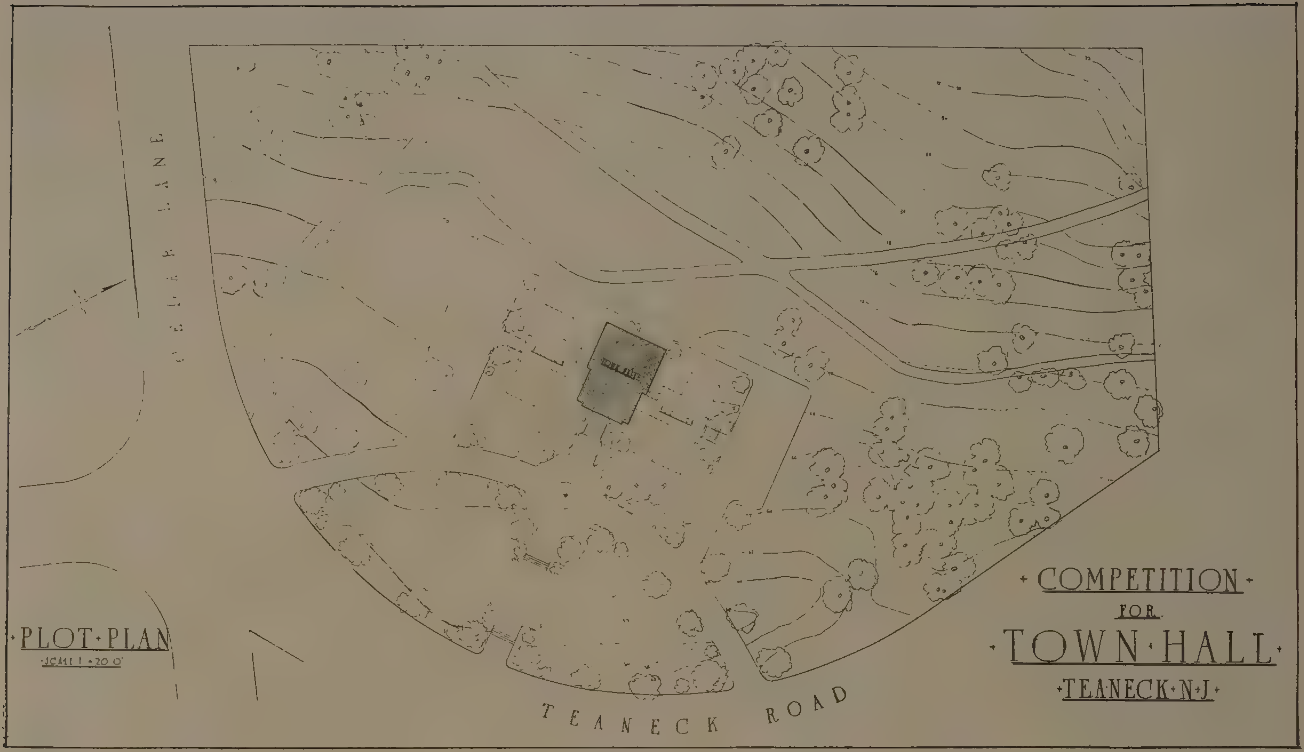
Drawings (*Mandatory*).—Drawings submitted shall be





COMPETITIVE DESIGN.

Dexter & Hacker, Architects.



according to the following list, at the given scale, and rendered as noted, and no other drawings than these shall be submitted:

Sheet No. 1.—Plot diagram of the entire plot with the complete building located thereon, showing the driveways, walks, parking space, etc. The wing to be erected should be clearly indicated. Scale —1/16″ equals 1′.

Sheet No. 2.—Basement plan of the wing to be erected at this time.

First floor plan of the same.

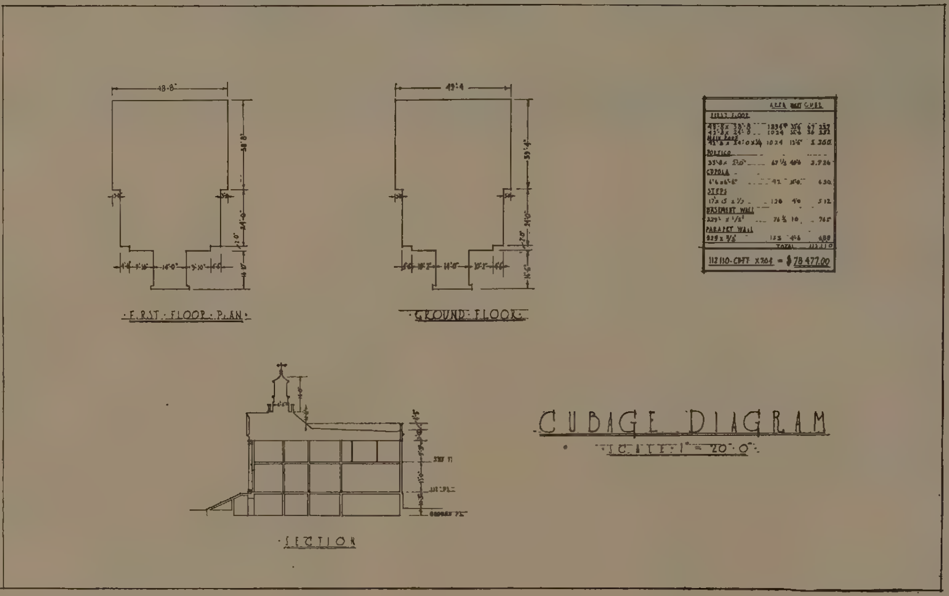
Second floor plan of the same.

Main elevation of the entire building.

All at 1/8″ scale; 1/8″ equals 1′.

Sheet No. 3.—Perspective of the wing to be erected at this time. Scale 1/4″ to the foot.

The drawings shall be on white tracing paper, in pencil, and the perspective shall be on white Whatman paper, rendered in wash, all to be mounted on heavy cardboard mats. A mounted Whatman mat used for the perspective. The drawings shall be on sheets 30″ × 51″.



Competitive design.

Dexter & Hacker, Architects.

Sheet No. 4.—Cubage diagram showing dimensions and method of calculation drawn to 1′ scale.

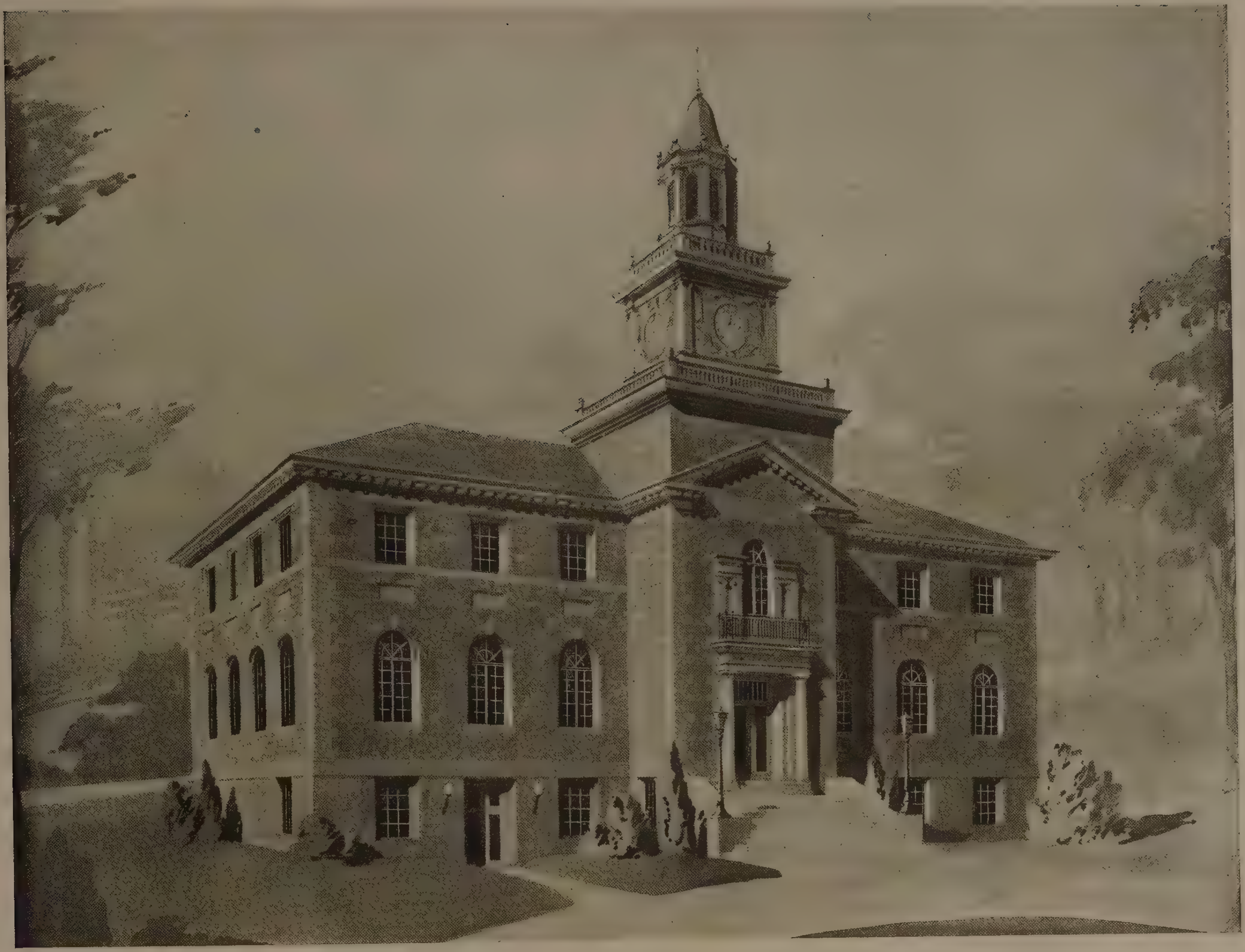
The Programme.—This programme in its entirety constitutes an agreement between the Commission on the one hand and each competitor severally on the other. It is understood, therefore, that each architect who submits a design in this competition thereby accepts the terms of the programme as binding upon him, both as to the said programme and any agreement that may grow out of it.

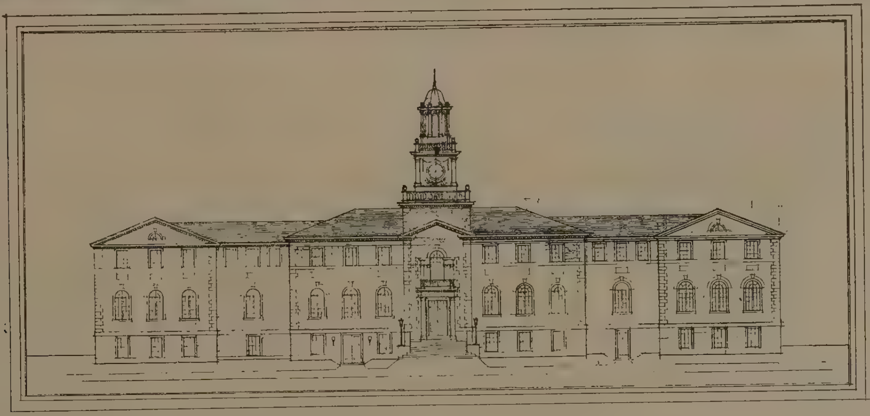
THE REQUIREMENTS

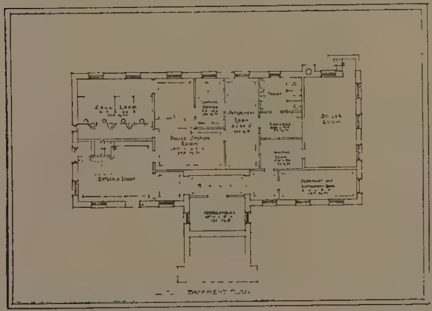
Basement.—This story should be entered without the use of steps from the ground level; either a ramp or advantageous use of the grades of the property should be employed. It shall contain besides the necessary boiler-room, coal-storage and stairs to the floors above, the following:

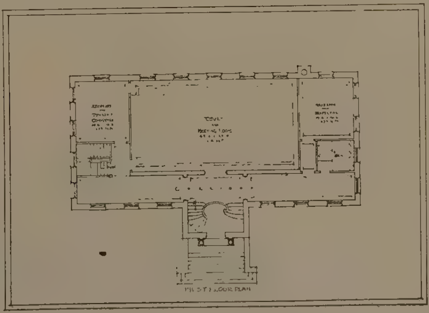
(*a*) Police Department with the:

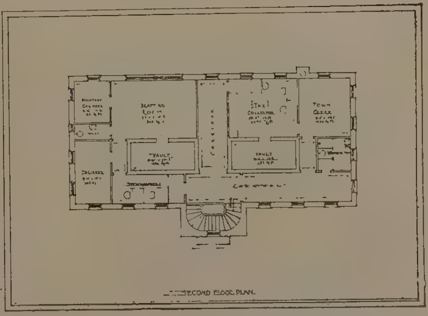
(1) Captain's office to accommodate a desk, filing cabinets, and a small safe;





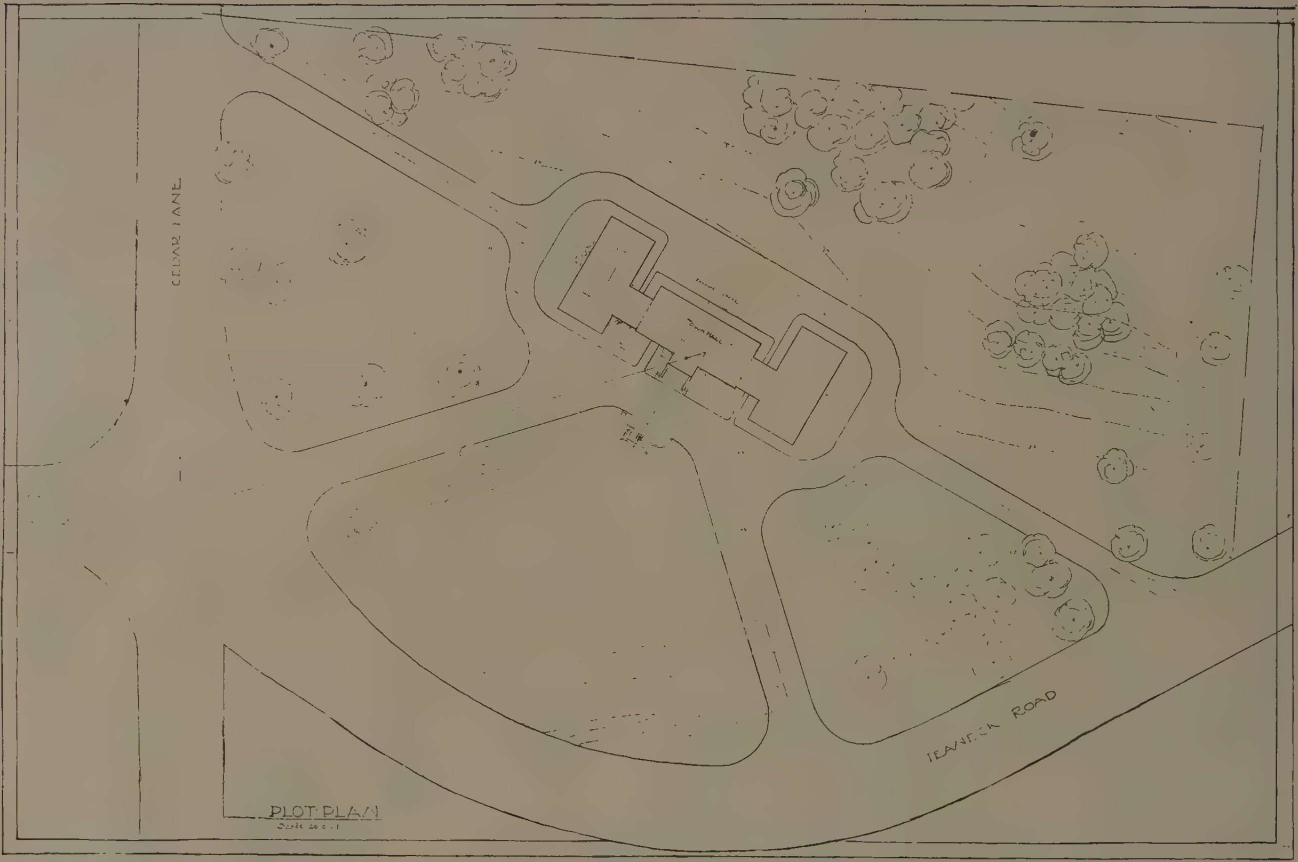


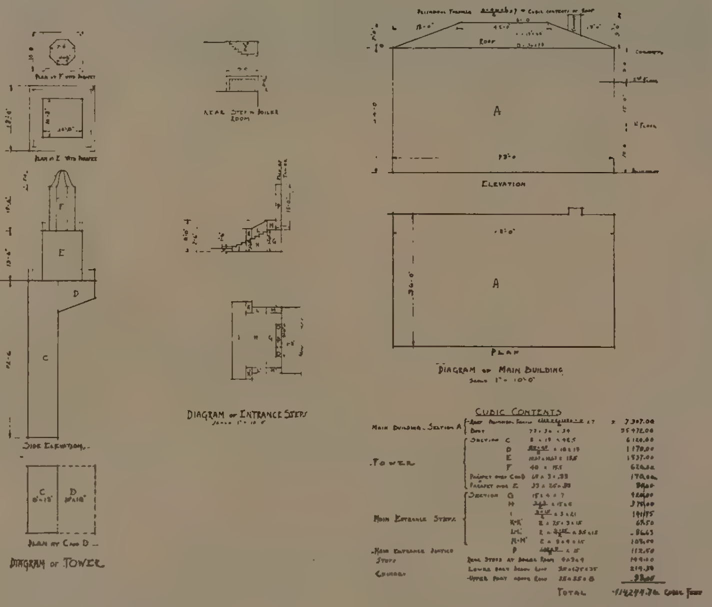




COMPETITIVE DESIGN.

Beverly S. King, Architect.





Competitive design. Beverly S. King, Architect.

(2) Police station room adjoining and connected to the above by a doorway, and large enough to accommodate a desk and seats for patrolmen;

(3) Call room, so situated that it will be entirely under the visual control of the officer on duty in the station room, and of a size to contain four cells;

(4) Patrolmen's room, for men off duty; to accommodate a table, chairs, and cot for an officer who sleeps in the department;

(5) Locker-room, with accommodation for fourteen (14) lockers;

(6) Wash-room equipped with two (2) lavatories, two (2) urinals, two (2) water-closets and one (1) shower;

(7) Motorcycle-room to accommodate eight (8) motorcycles. This room may be entirely outside the main walls of the building, and placed under a terrace, portico, or other architectural feature, but should be in any case adjacent to the basement entrance.

(*b*) Janitor's room.

(*c*) Blue print and instrument room for the Department of Public Works, to contain about one hundred twenty (120) square feet of floor space.

First Floor.—This story shall have an entrance independent from that through the basement, and shall include besides the staircase the following rooms:

(*a*) Court and meeting room to have at one end a platform about 10′ × 20′, and with a seating capacity of at least 150 people.

(*b*) Office of the Recorder and Township Committee to be so located as to have direct access through a doorway to the platform end of the court and meeting room.

(*c*) Office of the assessor and Inspector.

(*d*) Public toilet for men.

Second Floor.—This story shall contain besides the staircase the following:

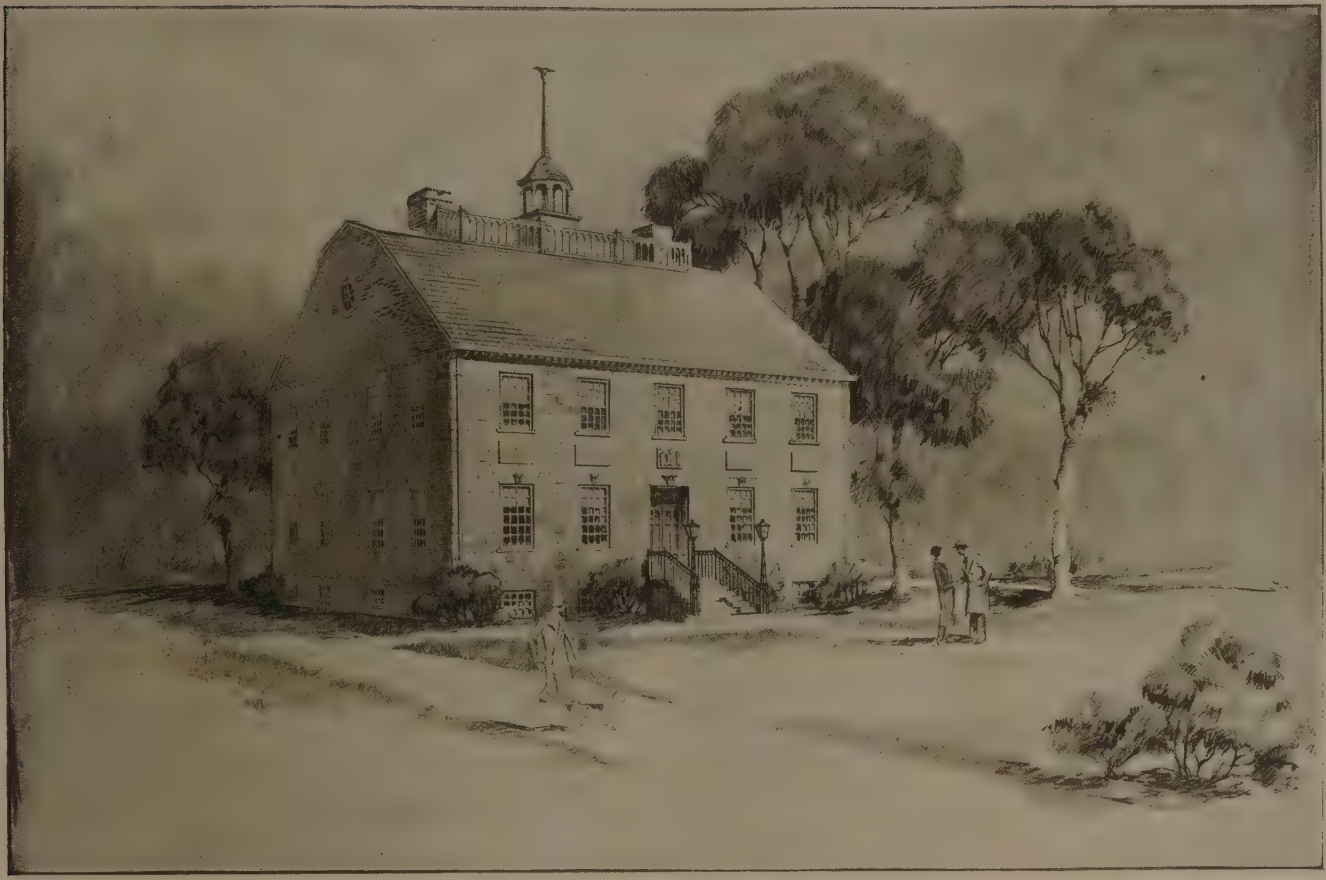
(*a*) Corridor of ample width.

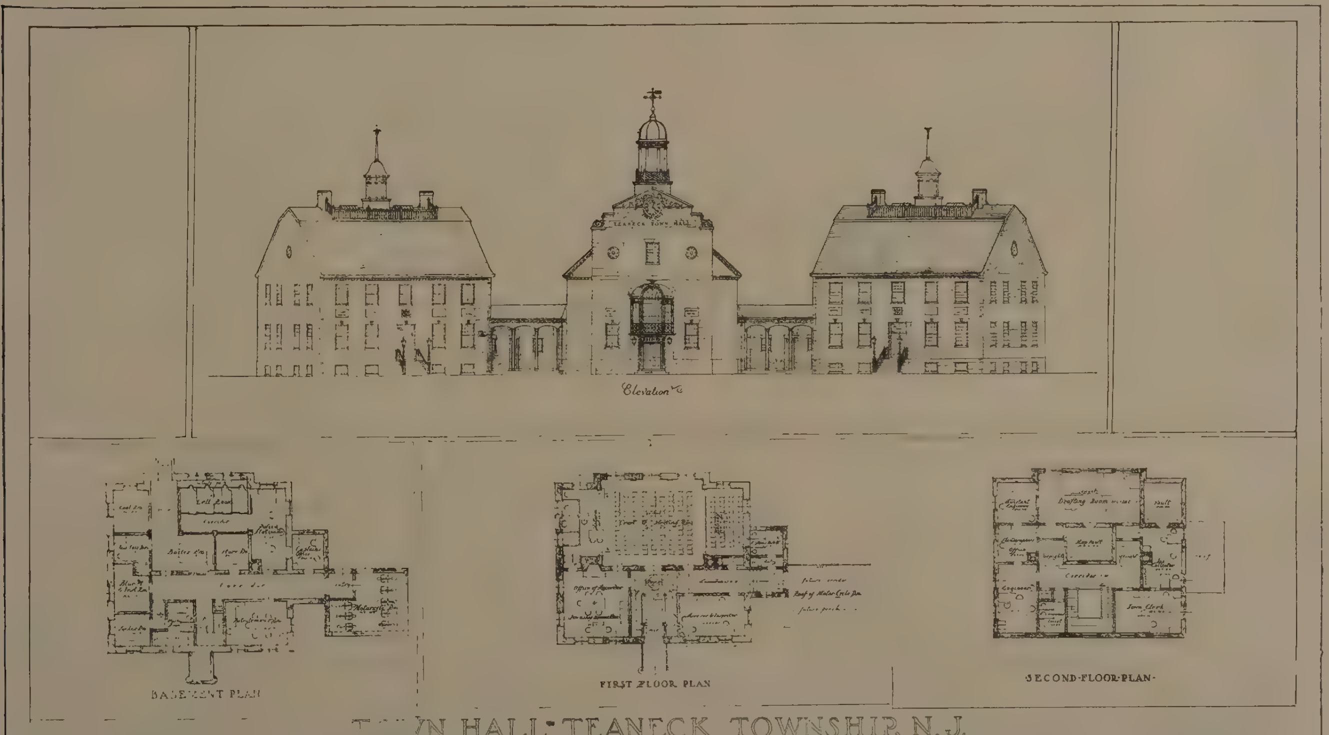
(*b*) Tax Collector's Department.

(1) Storage vault to contain about one hundred thirty (130) square feet floor space, and provided with a fire-proof vault door opening into the office.

(2) Office of Tax Collector, to have windows for the public opening onto the corridor, with counter under; space for two desks, stenographer, small safe and table for records, to be located directly in back of the counter.

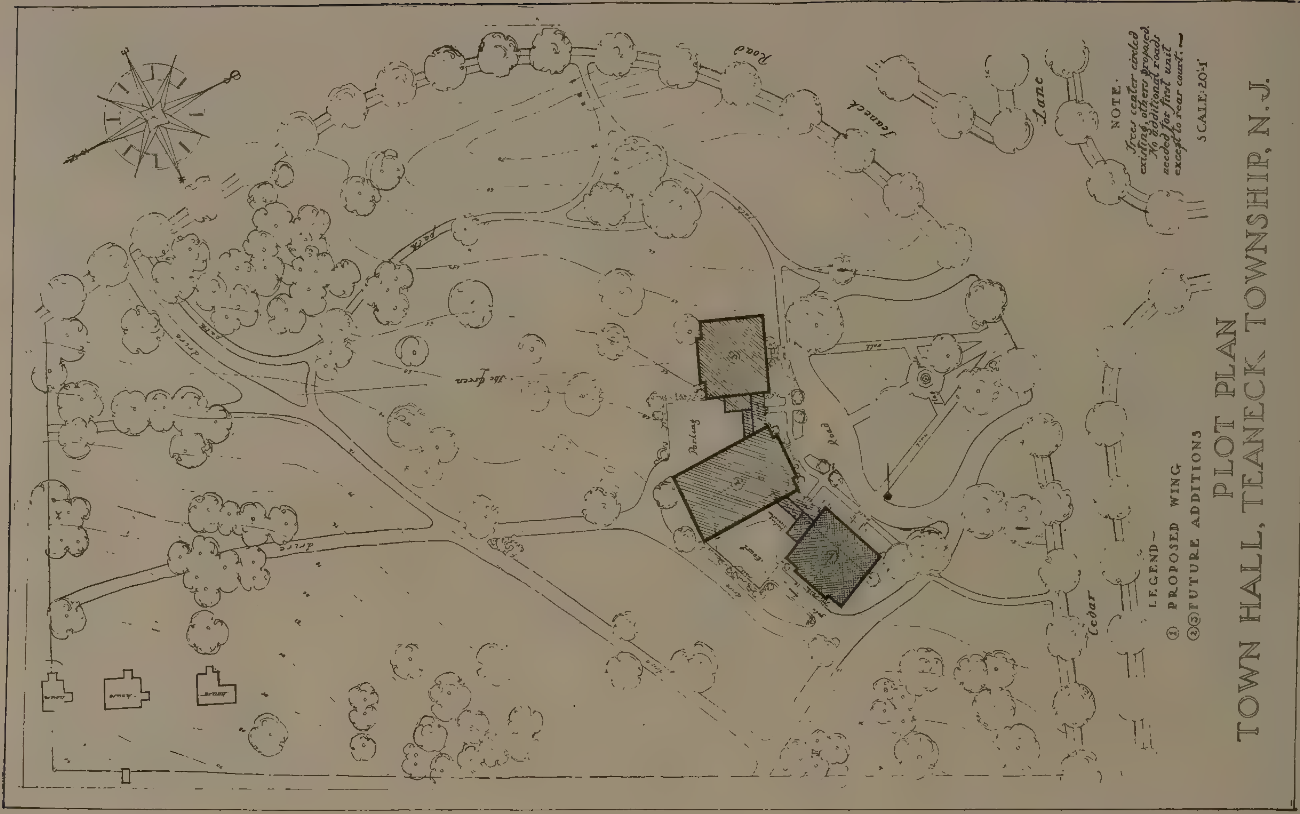
(*c*) Office of Town Clerk, to be located next to and connected by a doorway to the Office of the Tax Collector; to accommodate a desk, files, bookcase, and safe.

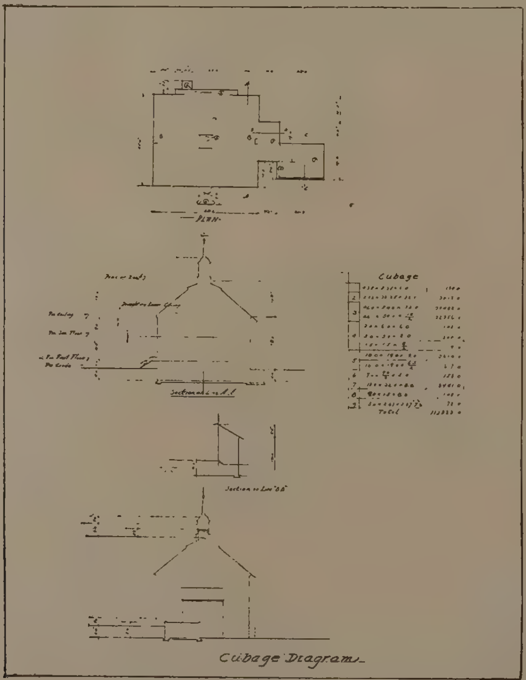




COMPETITIVE DESIGN.

Coffin & Coffin, Architects.


Teaneck Road
Lane
NOTE.
Trees center circled existing, others proposed. No additional roads needed for first unit except to rear court.
SCALE: 20'-1'
LEGEND—
① PROPOSED WING
②③ FUTURE ADDITIONS
PLOT PLAN
TOWN HALL, TEANECK TOWNSHIP, N. J.
The Green
Parking
Road
Court
Cedar



Competitive design. Coffin & Coffin, Architects.

(*d*) Department of Public Works to comprise:

(1) Stenographer's office, so located that the public in entering the department must pass through it, and to contain about one hundred (100) square feet of floor space.

(2) Office of Township Engineer, to contain about one hundred fifty (150) square feet of floor space.

(3) Office of Assistant Engineer, to be located at one end of and separated from the drafting-room by a glazed wood partition, and to contain about one hundred twenty (120) square feet of floor space.

(4) Drafting-room to be at least 15′ wide and 20′ long, with a lavatory located in the same. This room shall be provided with skylights in addition to any windows, and located preferably for the use of north light.

(5) Map vault, to contain about one hundred thirty (130) square feet floor space, and provided with a fire-proof vault door opening into the drafting-room.

(*e*) Public toilet for women.

Agreement between Owners and Competitors.

(*a*) *Design.*—The architect is to design the entire building and its immediate surroundings, and is to design or direct the design of its constructive, engineering, and decorative work, and its fixed equipment and, if further retained, its movable furniture and the treatment of the remainder of its grounds.

The professional adviser was Mr. Hobart B. Upjohn. The jury of award consisted of Mr. Edward L. Tilton, Mr. Benj. W. Morris, architects, and Mr. Geo. W. Burpee, engineer; together with the local building committee.

Committee on "Cubing of Buildings, A. I. A."

REALIZING that differences now exist among architects, contractors, appraisal organizations, bonding companies, and others concerned with the size and approximate cost of buildings as to the methods used in determining the cubical contents of any structure, the American Institute of Architects has appointed a committee to ascertain, codify, and review the various methods now in use and prepare a report to the Scientific Research Department of the Institute.

Suggestions or information relating to this subject which will assist the committee and the industry will be welcomed. They should be sent to D. Knickerbacker Boyd, Chairman, 112 South 16th Street, Philadelphia, Pa.

An Architect's Simple Engineering Problems

By DeWitt Clinton Pond, M.A.

ELEVENTH ARTICLE

UNTIL recently masonry walls and piers have been used for supporting almost all kinds of permanent construction. During the last thirty years, however, steel has been employed more and more extensively until now steel columns or concrete columns reinforced with steel are about the only kinds of isolated supports found in large buildings. In many cases, even the walls below grade are simply retaining walls, and are not used to support floor beams, and the columns that occur along the building line are used to buttress these walls, so, instead of acting as supporting members, these walls are actually supported. Even in small residences masonry piers in the basement are superseded by cast-iron or steel columns filled with concrete, which take up much less room. It is this saving in space that is responsible for the almost universal adoption of steel or iron supporting members, or concrete reinforced by steel.

For the use of the architect who is not engaged in the design of large reinforced concrete or steel-skeleton buildings, the metal supports that are most apt to be used are those manufactured by such companies as the Lally Column Co., the Crex Patent Column Co., the Milford Iron Foundry, or others that supply a type of column made of a steel shell filled with concrete, which may be reinforced with rods, or angle-irons, and equipped with brackets to carry the wood beams or girders that are framed into it.

Each manufacturer supplies a list giving the carrying capacity of the columns in terms of the diameters and heights, and as a rule these are approved by the building inspectors, so that the engineering design of such columns is a very simple matter. It will be noticed that the height of the column is an important factor. This matter will be discussed more thoroughly when the design of steel columns will be considered.

Suppose, in a country residence, there were a floor area of a living-room measuring 26 feet by 14 feet, one half of which was carried on the foundation wall, and one half on two girders framing into a column of the type referred to above. The girders run the long way of the living-room, and each has a clear span of 13 feet. A diagram showing this condition is shown in Fig. 22.

It is customary to allow 60 pounds for the total dead and live load where the ordinary type of residential construction is used, so, if the area of the floor which is carried by the column is determined, the load which the support must carry can be found by multiplying the area in square feet by 60 pounds.

As far as the living-room floor is concerned only one quarter of the load will rest on the column, as one half is carried by the wall paralleled with the longest dimension of the room, and one quarter will be carried by the girders to the end walls. In other words, the area of living-room floor carried by the column will measure 7 feet by 13 feet, and will contain 91 square feet. This will weigh 91 × 60 = 5,460 pounds. Another girder frames into this column. This girder carries part of the dining-room floor, and the area of floor that is supported by the column is 7 feet by 6 feet 6 inches, 7 × 6.5 = 45.5 square feet, which will weigh 45.5 × 60 = 2,730 pounds. The total of these loads is 8,190 pounds, and if the weights of the girders themselves and the additional load of the framing around the stair well are added, the total first floor load carried by the column will be 7,000 pounds, or 3½ tons. The partition which forms one side of the living-room, and which rests upon the two girders, is a bearing partition, and carries the second floor beams, which are framed parallel to and directly over the first floor beams. Therefore this will add another 3½ tons to the load on the column, which will make a total of 7 tons. Roof framing rests upon the outside walls, and with the exception of the ceiling beams no additional load bears on the second story partitions. Two tons more should be added for the load of the attic floor, making a total of nine tons. It might be well to note that if the second floor framing were very different from the first, it would have been necessary to determine the actual loading carried by the various partitions, and then to find how these loads were carried to the first floor girders, and thence to the columns. This would require some lengthy calculations, and it is doubtful if the ordinary conditions would be such as to make close calculations necessary, as will be shown.

The height of the cellar in this residence is 8 feet from floor to floor, and the height of the column can be considered as 7 feet. By referring to the tables of safe loads for columns of this style, which are furnished by the manufacturers, or which can be found in "Sweet's Architectural Catalogue," it will be seen that a 3½-inch diameter column with an unsupported length of 7 feet will carry 10 tons, or 10 per cent more than the loading that will actually rest upon the support. Therefore, a 3½-inch column—the one having the least diameter of any manufactured—will be more than large enough to carry the floor loads that will rest upon it.

From this it can be seen that for ordinary residential buildings, in which the spans are about the same as those given above, it is hardly necessary to carry out a set of complicated calculations. For ordinary conditions a 3½-inch column is large enough, and if spans become larger a 4-inch column, which, for this height, carries 13 tons, is more than strong enough.

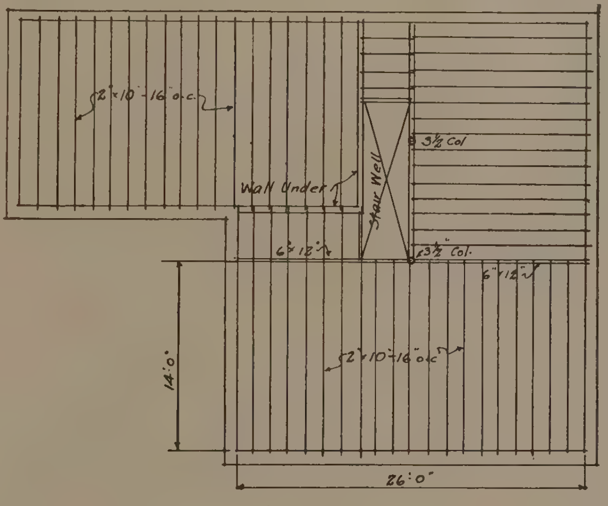


Fig. 22

Of course, if columns of this type are used in mill construction, where the floor construction itself is much heavier and the live loads are more than three times as heavy as in residential work, all loads must be carefully calculated, and the heavy weight type of columns will probably be required. When such conditions are encountered an experienced engineer should be commissioned to design the supporting members.

Columns of the type referred to above are not often used where it is necessary to carry them to any height, as it is difficult to make rigid connections. For this reason where steel beams frame into columns it is usual to employ steel sections, which can be riveted or bolted.

Steel columns can be fabricated out of plates and angles, or channels, or they can be of the type supplied by the Bethlehem Steel Company, which require no fabrication except where unusually heavy loads are to be carried, when it is necessary to reinforce the ordinary shapes by means of plates.

When steel columns are to be designed a factor known as the "radius of gyration" enters into the calculations. This term is even more difficult to understand than the moment of inertia referred to in the article on beam design. To attempt to define the radius of gyration would result in a combination of words that would be practically meaningless, but as it is doubtful if even experienced engineers can explain what is meant by this term, there is no reason why an architect who only requires a working knowledge of design for simple problems, should worry about such a definition.

The practical use of such a factor, however, is another matter. By referring to the "Catalogue of Bethlehem Structural Shapes" it can be seen that in tables of dimensions and properties of H columns, the radius of gyration is listed in the same manner as are the area, weight, and dimensions of each section. If it is desirable to find the *least* radius of gyration of an 8-inch, 72-pound H section, it is only necessary to look in the table in the catalogue, and under the heading "Radius of Gyration—r′—Axis Y Y," to find this factor listed as 2.12.

The reason for the need of knowing the radius of gyration is that almost every building code states the allowable loads on steel columns in terms of the unsupported length of the column divided by the least radius of gyration. As an example, in the New York Building Code, Article 3, Section 52, the following working stresses for steel columns are given in paragraph 4, in pounds per square inch of cross section when the length divided by the least radius of gyration equals:

120	7,600	pounds
110	8,300	"
100	9,000	"
90	9,700	"
80	10,400	"
70	11,100	"
60	11,800	"
50	12,500	"
40	13,200	"
30	13,900	"
20	14,600	"
10	15,300	"

If the 8-inch, 72-pound H section is to be used for a column having an unsupported length of 11 feet, in order to find what the safe working stress over the area will be, it is necessary to divide 132 inches by 2.12. $132 \div 2.12 = 62.2$.

For the ratio of 60 the allowable stress is given as 11,800 pounds per square inch, and for a ratio of 70 the stress is 11,100. By proportion it can be found that the allowable stress for a ratio of 62.2 is 11,642 pounds. By again referring to the catalogue it can be found that the area of the column is 21.05 square inches, so the carrying capacity of this section for a height of 11 feet is:

$$21.05 \times 11{,}642 = 245{,}000 \text{ pounds.}$$

It might be well to note that the stresses arrived at in the New York Code are derived from a formula given below, and which is the same as used in Chicago and St. Louis. This formula is $f_s = 16{,}000 - 70\frac{l}{r}$, in which l is the unsupported length in inches, and r is the least radius of gyration.

If it were desirable to use the formula in the problem given above, the calculations would be as follows: $l = 132$ inches; $r = 2.12$; $l/r = 132 \div 2.12 = 62.2$; $70 \times 62.2 = 4{,}354$; $16{,}000 - 4{,}354 = 11{,}646 = f_s$.

The stress arrived at is practically the same in either case, and would be exactly the same if the calculations were carried further beyond the decimal point.

There are a few considerations that may be worth some attention. From the formula it is apparent that the stress on the steel can never equal 16,000 pounds per square inch, which is the safe compression as well as the safe tensile stress in steel. This is due to the fact that in columns there is danger, not only of crushing, but of bending, and as the height becomes greater this tendency increases. Therefore the allowable stress decreases.

The radius of gyration is given in the Bethlehem catalogue for the H sections, and in the Carnegie "Pocket Companion" for certain fabricated sections, but if a special section is required, this factor must be determined by means of somewhat lengthy calculations, an explanation of which is given in the author's book, "Engineering for Architects."

The ratio l/r is often called the slenderness ratio, and this in most cities must not exceed 120. A column with the same section, but twice as long as the one given in the problem, would not be allowed in New York.

The problem that was given is not exactly the kind that the architect is usually confronted with. Usually the loads that rest upon columns are determined first, and the column must then be designed to carry the load. When the architect has no table of safe loads on columns in front of him, he must assume the probable allowable stress, divide the load by this amount, find the area of steel in the section, and look up the section that will provide such an area. He must then check his results to see if the section has a proper radius of gyration, and if the assumed stress is the correct one. After a little practice it is not difficult to make some very close assumptions.

Color Effects in Slate

SLATES differ in color, and some colors are much more in demand than others, the preference being based more on tradition than on artistic taste or actual qualities of the slates, states Oliver Bowles, mineral technologist of the Bureau of Mines, who has completed a study of the technology of slate for the Department of the Interior. A wider market for colors not now in demand depends, therefore, on the cultivation of public taste, states Doctor Bowles. Architects and builders can widen the field of utilization of roofing slate by judicious efforts to popularize new colors or combinations of colors.

Slates are classed as fading or unfading according to their color stability. The fading of green slates is probably due to the presence of iron carbonate, which seems to be present not as pure siderite but as an isomorphous mixture of the carbonates of iron, lime, magnesium, and possibly manganese. The hydrous iron oxide formed by decomposition of the carbonate through action of certain solvents carried in rain-water destroys the green color and causes fading. The black and gray slates usually contain small amounts of such constituents, and are therefore nearly permanent in color. Bluish slates commonly turn grayish, and red slates may turn brown. The green slates are the most uncertain; some are practically permanent in color, but others fade and discolor badly.

A moderate and uniform fading may not be detrimental, but may produce a more pleasing effect, though in replacing broken slates it may be difficult or impossible to match the colors. Non-uniform fading results in spots or streaks, and is undesirable. The formation of some spots is due to the weathering of grains of the iron sulphides, pyrite, or marcasite.

Spots and blotches are very objectionable in slates. Many of the red and purple slates contain pale-green spots, some bordered with purple. The spots range in size from minute specks to spots two inches or more across, some are circular or oval, and others are irregular. In places the spots form bands or ribbons.

It appears that the pale-green spots in the red and purple slates are due to chemical changes caused by the decay of organisms embedded in the clays from which the slates were formed.

Finds Aluminum Paint Makes Radiators Less Efficient

THE aluminum or bronze paint generally applied to radiators greatly reduces their effectiveness and makes it necessary to have a larger surface for the same heating effect, according to experiments performed by Doctor W. W. Coblentz, of the Bureau of Standards. Doctor Coblentz finds that the heat radiated from an aluminum-painted radiator surface is less than a third of that emitted by a radiator of the same size painted with a non-metallic paint, enamelled, or simply allowed to rust.

On the other hand, he finds that aluminum paint is a very effective means of reducing the amount of heat transmitted through a thin material. Applied to the under side of a tent or awning, it reduces by three-fourths the amount of heat from the sun which gets through the cloth, while if used on the cover of an automobile or ice-wagon it cuts in half the heat let through and makes the temperature inside the vehicle more nearly that found in natural shade, thereby making it much more comfortable.

The Rural Mail Service Has Put an End to Isolation and Ignorance of National Affairs

FEW institutions in the history of American progress can be credited with a more salutary effect upon the march of that progress than the Rural Mail Service of the Post Office Department.

No other single instrumentality has done more than the Rural Mail Service toward "bringing the city to the country" and relieving the prosaic existence of farm life, or has been as effective in establishing closer contact between the farmer and his markets. It has been the most important factor in making agriculture an exacting business instead of its one-time precarious classification which conveyed no broader meaning than "tilling the soil."

Twenty-nine years ago the farmer, and his wife and children, led an existence of almost complete isolation, living upon widely scattered farms, some of them miles apart. They had comparatively little communication with their neighbors or the outside world, except that derived from weekly trips to the adjacent village. More often than not the farmer lost a full day's work and his crops were neglected in order to obtain expected mail at the village post-office.

In those days the farmers' mail consisted largely of communications from relatives and friends. To-day the daily mail includes, usually on the very date of publication, the metropolitan newspaper, containing market reports and agricultural news; the weekly and monthly farm journals and magazines, and business letters from the village merchant and the more pretentious establishment in the distant city. All of these are now brought to his door, or to the box a few yards away.

The rural carrier is the farmer's post-office and his agent. Through him he conducts transactions for the sale of his live-stock, grain, and other farm produce. From him he buys stamps and pays his bills by postal money order. In short, the letter carrier is the medium that has transformed the once secluded habitant of the rural district into a cosmopolitan citizen conversant with current affairs and occupying a larger place in the destinies of a great nation.

Smithey & Tardy, architects and engineers, wish to announce that Mr. Herbert Johnson Burke has become a member of the firm and will be associated with them in the general practice of architecture at 112 Kirk Avenue, West Roanoke, Va.

Mr. Burke attended the Virginia Polytechnic Institute, taking a preliminary course in civil engineering, and is a graduate in architecture from Columbia University, afterward doing research work abroad.

FORD HARDWARE COMPANY INC
25 WEST 45TH STREET
NEW YORK
Authentic Reproductions of Forged Hardware
Visit our showrooms

Main dining-room of the Hotel Commodore, New York.

Tiles the color of old ivory with here and there, for the sake of contrast, a single square of jet black, harmonize subtly with the unusual decorations of this sumptuous room.

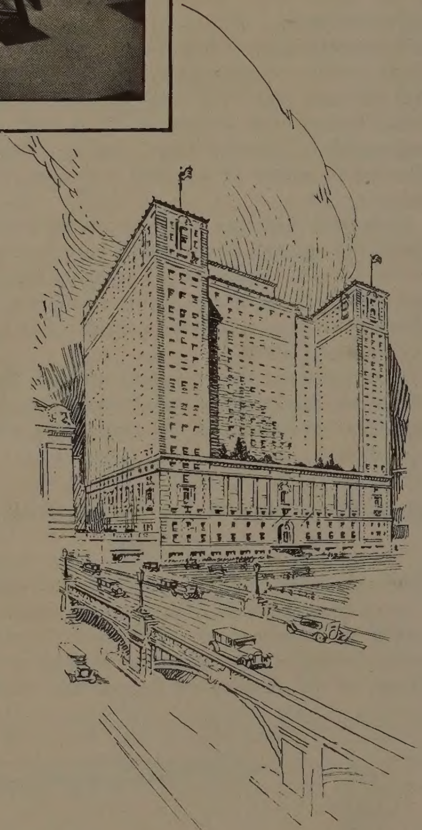
In the Hotel Commodore—

Enter the main dining-room of the Hotel Commodore, New York City. How subtly the cool, comfortable-looking floor, of *Gold Seal* Treadlite Tile, enhances the detail of the decorative scheme! How restfully it cushions the shock and absorbs the sound of your footsteps!

We take pride in our contribution to this beautiful room, in one of the world's premier hotels. It is a real testimonial to the beauty and quality of Bonded Floors.

Whether the aim is to secure a floor of unique artistic distinction, or one of business-like practicality, you can rely upon our nation-wide organization to install highest grade materials with scientific precision. Let us cooperate with you.

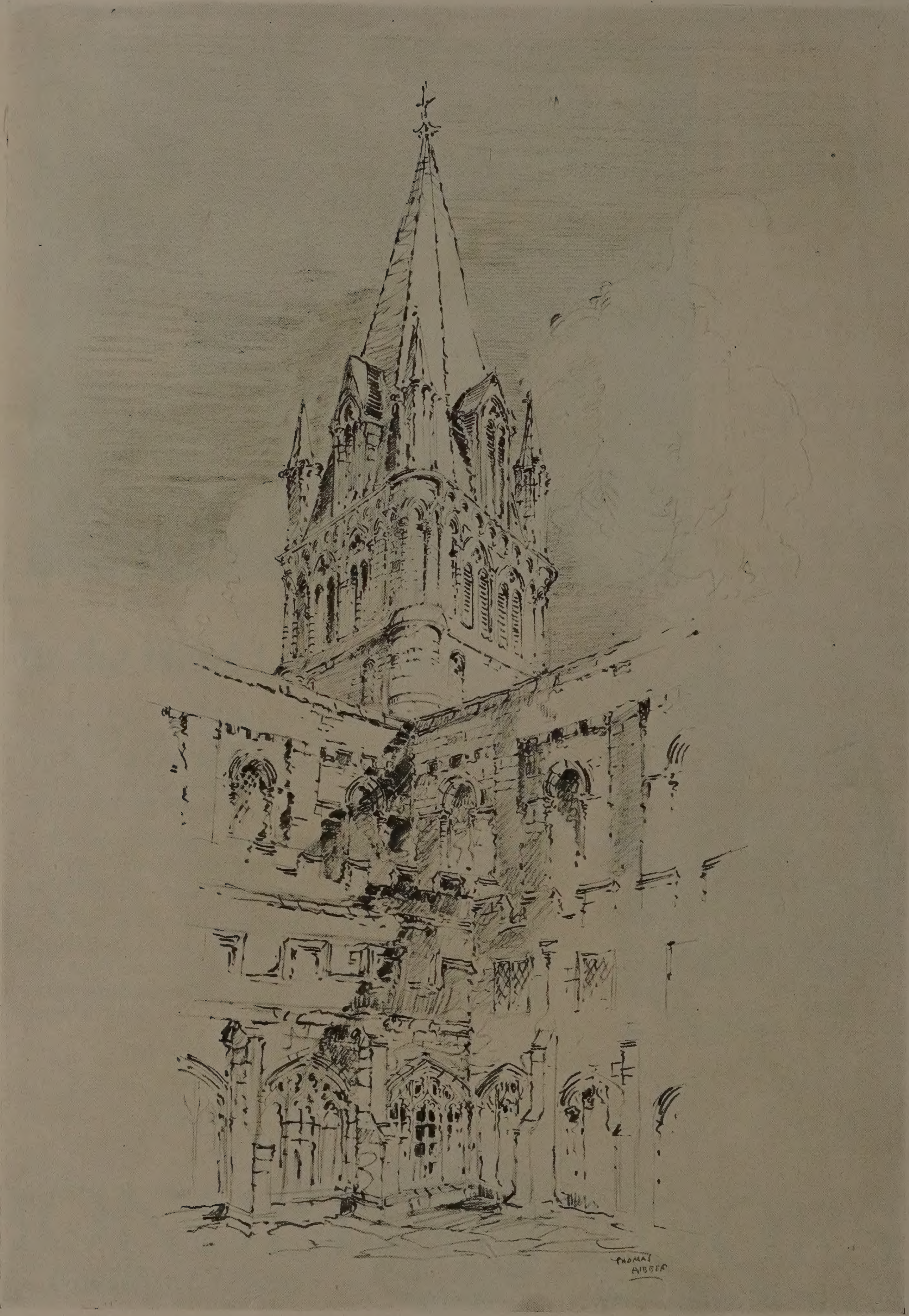
BONDED FLOORS CO., INC.
Division of Congoleum-Nairn Inc.
New York · Boston · Philadelphia · Cleveland · Detroit
Chicago · Kansas City · San Francisco · Los Angeles



BONDED FLOORS

Resilient Floors for Every Need

127



CHRIST CHURCH COLLEGE, OXFORD, ENGLAND.

From the pencil drawing by Thomas E. Hibben.